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Editorial

There is increasing recognition in India that Agricultural Research and Extension must be more responsive to the needs and constraints of the farming community. Moreover, the need for empowering farmers and linking rural people to research, extension and to each other through information technology for facilitating access to crucial information is also recognized.

The purpose of bringing out the **“MANAGE EXTENSION RESEARCH REVIEW”** is to disseminate the wealth of information available in these papers and raise issues to stimulate discussion and assist the Government in evolving a policy frame work.

This is the first publication of the series **“MANAGE EXTENSION RESEARCH REVIEW”** which includes the papers contributed by the faculty members of MANAGE. It covers extension management issues in the areas of Watershed, Human Resources Development, Agri-business, Floriculture, Plantation, Animal Husbandry and future perspective of Indian Agriculture.

I hope this venture will achieve its dual purpose of disseminating information as well as evoking a feedback from the Government, academicians, scientists and the general public, interested in prosperity of farmers.

A.K. Goel
Chief Editor

*Views expressed in the articles are of
the authors and not necessarily of the
Institute.*

Editor

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AGRICULTURAL PRODUCTION SCENARIO IN 21st CENTURY

A.K. Goel*

Nation's policy-makers in India have a dream today. And it is to double the Agricultural production during next one decade. Growth profile of different commodities is bound to be different. Moreover, regional and state specific variations are bound to add yet another dimension to the expected basket size. Let us look at the growth trend of each commodity during last 5 decades so as to project it upto the year 2010.

Wheat

Success story of green revolution started unfolding 32 years ago. Wheat yield since then is moving in only one direction – upwards. India has overtaken several countries during this long marathon. Europe was overtaken during mid-80's. Now, USA has been overpowered both in terms of production and yield. Only China is ahead of us today. But during next decade, we are almost going to be at par or even excel them. Around 26 MH. Area with 95 percent irrigation coverage would produce 105 MT of wheat by 2010. Production and productivity gains would be in UP, Punjab, Haryana, Madhya Pradesh, Rajasthan and Bihar and these six states would contribute more than 95 percent of India's wheat production by 2010.

Rice

Rice is essentially water driven crop. Availability of adequate water quantities as well as its proper control and management would determine its production behaviour in future. Area under Rice is saturating around 43 MH. Operations and maintenance of canal and distributory system must be in the hands of farmers through water user associations. Tube wells irrigation with reasonable power tariff would also optimize the water usage and minimize wastage of this precious natural resource. We are 2nd in the world – next to China in Rice production and are likely to remain so by 2010 as well. Around 43 MH with 60 percent irrigation coverage would produce around 111 MT. of Rice by then. Production and

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productivity gains would be seen in West Bengal, Uttar Pradesh, Andhra Pradesh, Tamil Nadu, Bihar, Punjab, Orissa, Madhya Pradesh, Assam and Karnataka. These ten states would contribute more than 90 percent of India's Rice production by 2010.

Coarse Cereals

It includes jowar, bajra, maize, ragi, barley and small millet. Total area under coarse cereals peaked during mid sixties at 47 MH. It has been declining since then. The trend is likely to continue in the future too except for maize. In different states, the shift is clearly towards commercial crops like oilseeds, cotton, vegetables and fruits. Maize appears to be the only exception due to its direct linkage with poultry industry. Total area be around 20 MH with 10 percent irrigation coverage producing around 38 MT. of coarse cereals by 2010. Production would be concentrated in Maharashtra, Karnataka, Uttar Pradesh, Rajasthan, Madhya Pradesh, Andhra Pradesh, Gujarat and Bihar. These eight states would contribute more than 90 percent of India's coarse cereals production by 2010.

Pulses

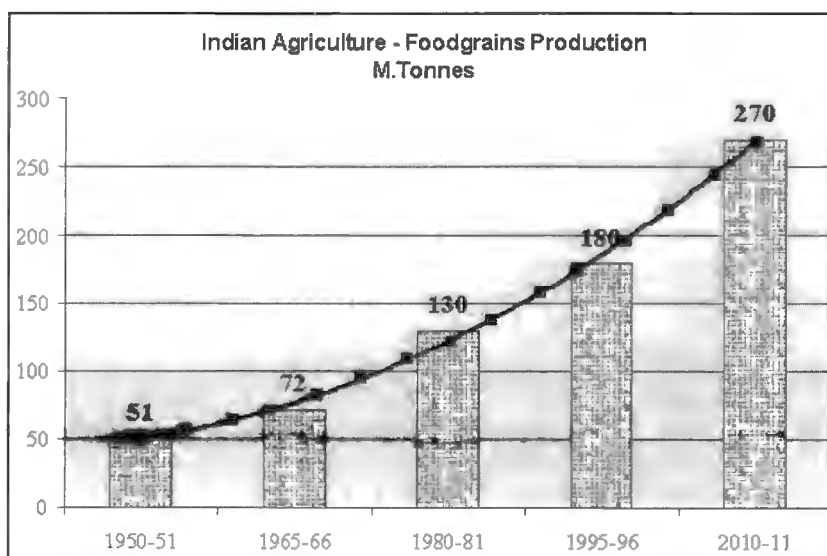
With around 23 MH of area constantly committed for last 40 years or so, India is the largest producer of pulses in the world. However, yield at around 600 Kg. per hectare far lags behind global standards of 850 Kg. per hectare. Total area under pulses would remain the same 23 MH with 12 percent irrigation coverage producing around 16 MT pulses by 2010. Production would be concentrated in M.P. U.P. Maharashtra, Rajasthan, A.P and Karnataka. These six states would contribute more than 80 percent of India's pulses' production by 2010.

FoodGrains Scenario in 2010*

Country has recorded the highest foodgrains harvest crossing 200 MT mark this year. Production level in 2010 is estimated to be around 270 MT – a gross increase of 35 percent. Historical trend along with future projection are tabulated as follows.

Using the estimates of compound growth rates, production is "puffed up" for the year 2010.

Sl. No.	Commodity Unit	1950-51	1965-66	1980-81	1995-96	2010-11
1	Wheat (M.T.)	6	10	36	62	105
2	Rice (M.T.)	21	31	54	77	111
3	Coarse Cereals (M.T.)	15	21	29	29	38
4	Pulses (M.T.)	8	10	11	12	16



Non-Food Grain Production

Sugarcane, Cotton and Oilseeds are covered under this category.

Sugar Cane

Like Rice, sugarcane is also water driven crop. It needs good land as well as good quantities of irrigation water. Moreover, control and management aspect of water ultimately determines the productivity level of this crop. Area under sugarcane cultivation has steadily climbed from 2 MH. in 1956 to 4 MH. in 1996. More importantly, irrigation coverage has gone up from 65 percent to 90 percent in the same period. Around 5.5 MH. area with 95 percent irrigation coverage would be under cane by 2010. In fact, the control and management

of water by farmers directly and professional management of sugar factories ensuring prompt payment to farmers would be key to productivity. Successful models of water management involving water users associations and factory management involving farmer cooperatives are very much functioning in various states and are replicable. Right now, India is only next to Brazil in sugarcane production. But, by 2010, we are going to produce around 365 MT. and occupy the top rank. Production and productivity gains would be seen in U.P, Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat, Haryana and Punjab. These eight states are likely to contribute more than 95 percent of sugarcane production in the country by 2010.

Cotton

Area under cotton has gradually climbed from 5 MH. in 1950 to 9 MH in 1997. Equally important fact is increased irrigation coverage from 8 percent then to 34 percent now. This trend of more area with more irrigation coverage is likely to continue in future too. Productivity breakthrough was witnessed during late eighties with costly seeds and costlier pesticides. Sudden spurt in profitability made cotton look like white gold in early 1990's. Heavy investments were made by farmers often by borrowing capital at a very heavy interest rates. Spurious pesticide companies egged on farmers to keep the gamble going. But the returns were not golden all the years. When crops failed, several farmers committed suicides in states like Andhra Pradesh, Karnataka, Maharashtra, and Punjab. Phenomena were driven by spurious inputs and unbridled human greed. But, of late, a better sense is dawning upon all wherein pesticide inputs have moderated without affecting productivity. This trend is healthy and wise both. We expect around 12 MH areas with 40 percent irrigation coverage to produce 19 M bales of cotton by 2010. Production and productivity gains would be seen in Maharashtra, Punjab, Gujarat, Haryana, Andhra Pradesh, Rajasthan and Karnataka. These seven states are likely to produce more than 95 percent of cotton in the country by 2010.

Oilseeds

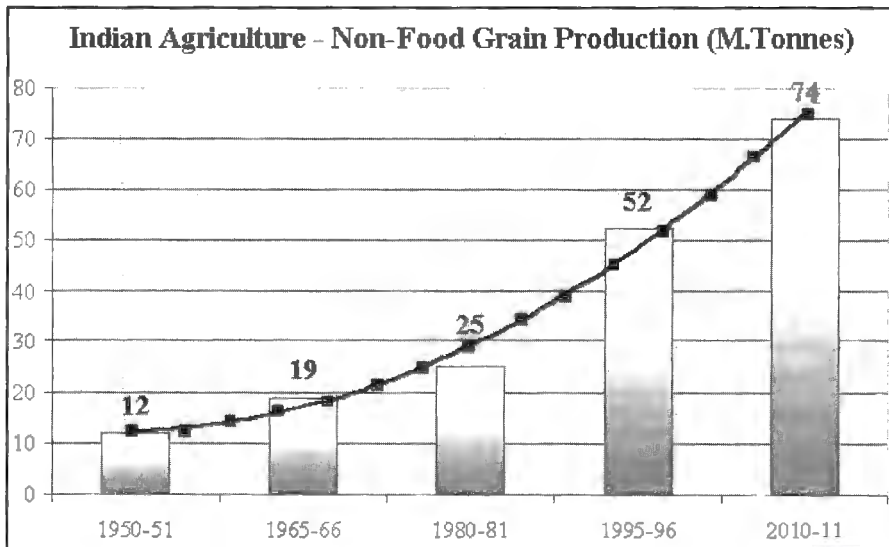
Area under oilseeds has climbed from 10 MH. in 1950 to 27 MH. in 1997. More important fact is that 25 percent of this area is under irrigation today which was almost nil in 1950. Thus, the trend of more area along with more coverage under irrigation is likely to continue in the future too. Breakthrough in productivity came during 80's under oilseeds technology mission. There is stillroom for more improvements. Around 38 MH of area with 35 percent of irrigation coverage

is likely to produce 38 MT. of oilseeds by 2010. Production and productivity gains would be witnessed in M.P., Rajasthan, Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Tamil Nadu and Uttar Pradesh. These eight states are likely to contribute more than 90 percent of oilseeds production in the country by 2010.

Non-Food Grain Production Scenario in 2010

Present output of Sugarcane, Cotton, and Oilseeds is likely to grow by 30 percent, 45 percent and 70 percent by 2010 as tabulated below.

Sl. No.	Commodity Unit	1950-51	1965-66	1980-81	1995-96	2010-11
1	Sugarcane (MT)	57	124	154	281	365
2	Cotton (M. Bales)	3	5	7	13	19
3	Oilseeds (MT)	5	6	9	22	38



Livestock Production

Milk, Fish, and Poultry are covered under this category.

Milk

India can proudly claim to be the milk superpower of the world today. It has edged past USA just this year by recording 76 MT production. Milk graph started

climbing in early 70's after green revolution. More crops meant more residues – and eventually more milk. Animal Breed upgradation and health care provided opportunities to small and medium dairy farmers to make it a commercially viable preposition. There are no big corporate names behind milk revolution. In fact, it is powered by tens of millions of ordinary dairy entrepreneurs scattered in all the villages across the country. Animal population would by and large remain constant – but production is estimated to cross 120 MT. by 2010 – through the Milky Way.

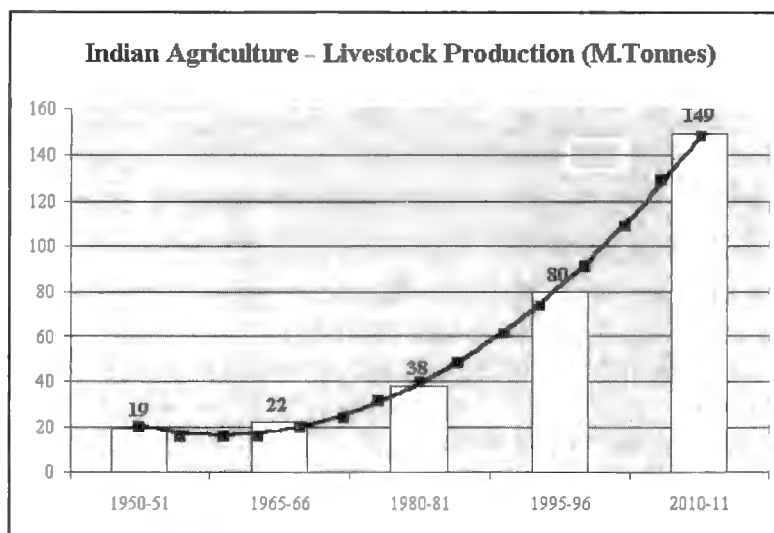
Fish and Poultry

The decade of 80's saw considerable breakthrough in productivity and overall production of both of these commodities. Fish production doubled and eggs production almost trebled from 1980 to 1995. The same upwards trend is likely to continue in future. We expect fish production to be around 8 MT and eggs output to exceed 60 billion nos. by 2010. Six states namely West Bengal, Gujarat, Kerala, Tamil Nadu, Maharastra and Andhra Pradesh would account for more than 75 percent of fish production. Regarding eggs, six states namely Andhra Pradesh, West Bengal, Maharastra, Punjab and Kerala would contribute more than 70 percent of its production.

Livestock Production Scenario in 2010

Growth in this area has surged beyond expectations during last two decades. We are going to witness a revolution during the decade ahead. Present output of milk, fish and eggs would grow around 50 percent, 70 percent and 150 percent by 2010 as shown below.

Sl. No.	Commodity Unit	1950-51	1996-66	1980-81	1995-96	2010-11
1	Milk (M.T.)	17	19	32	66	120
2	Fish (Lakh Ton)	8	15	24	50	80
3	Eggs (Billion nos.)	1.8	4	10	27	60



Horticultural Production

Vegetables and fruits are covered under this category.

Vegetables

With 6 MH area producing 70 MT., India is the world's second largest producer of vegetables – only next to China. Production can be divided into two kinds. One is grown in interior villages for internal consumption. The other is grown in suburbs mostly by small and marginal farmers to cater to nearby urban and semi-urban markets. Area under all important vegetables like potato, onions, tomato, okra, cabbage, cauliflower and peas is expanding to cater to ever growing urban needs on one hand and fast changing rural tastes on the other. This trend would continue in future too. We expect around 8 to 9 MH. area to produce 110 MT. of all variety of vegetables by 2010. Production and productivity gain would be witnessed all across the country, but more particularly so in states like Bihar, U.P., West Bengal, Tamil Nadu, Orissa, Maharashtra, Kerala, Punjab, Delhi and Haryana.

Fruits

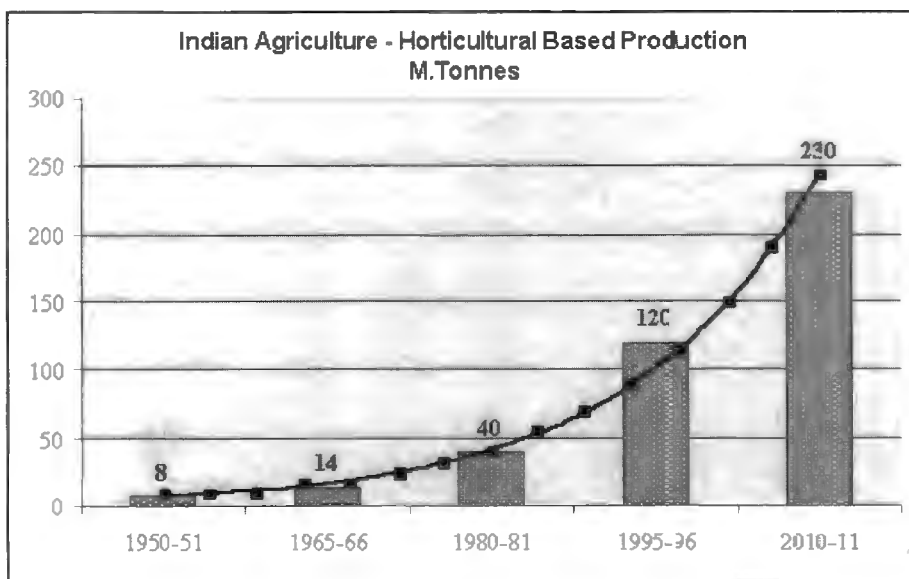
Area under fruits and overall production has increased dramatically since early 90's. Both have almost doubled in a short span from 1991 to 1997. And the trend continues unabated. This is essentially a capital based high technology venture which is normally driven by the enterprising genius of medium and large farmers. In the wake of liberalisation from 1991 onwards, several states like

Karnataka, and Maharashtra have relaxed the provision of Agricultural Land Ceiling Act to encourage horticultural ventures. Thus, liberating land from the jaws of Agricultural Land Ceiling Act coupled with technology and capital intervention has transformed the farmer from a mere manager of inputs to a powerful entrepreneur of resources during liberalisation decade of 90's. As on today, 5 MH of area is producing around 50 M.T of fruits of all kinds. By 2010, we expect around 10 MH of area to be producing around 120 MT of fruits. Leading states would be Andhra Pradesh, Maharashtra, Tamil Nadu, Karnataka, Bihar, Uttar Pradesh and Gujarat. These seven states would account for more than 70 percent of fruits output by them.

Horticultural Production Scenario in 2010

The decade of 90's has witnessed an explosive growth in this sector. By 2010, we are likely to witness, yet again almost 100 percent growth over and above present production levels.

Sl. No.	Commodity Unit	1950-51	1965-66	1980-81	1995-96	2010-11
1	Vegetables (M.T.)	-	-	-	70	110
2	Fruits (M.T.)	-	-	-	50	120



CONCLUSION

The overall size of national agricultural basket would grow around 60 percent by 2010. It includes foodgrains, animal and agro-industry based and horticultural produce. Population size may grow by 20 percent by then. Thus, aggregate availability from this composite basket to each family is going to be fairly comfortable – say 33 percent more than what it is today.

However, the dream of the nation's policy makers to double the agricultural production by 2010 is likely to fall short by 40 percent mark. To realize the dream, we have to move beyond the confines of green revolution witnessed during 20th century – into the realm of all-green and evergreen revolution just waiting to unfold into 21st century.

Reference

1. Centre for Monitoring Indian Economy Pvt. Ltd., (CMIE), "Directory of Indian Agriculture", 1996.
2. Directorate of Economic & Statistics, Ministry of Agriculture, Govt. of India "Agricultural Statistics at a glance" 1996.

SUSTAINABLE DEVELOPMENT OF NATURAL RESOURCES THROUGH INDIGENOUS TECHNOLOGIES – A CASE STUDY OF MANCHAL WATERSHED IN RANGAREDDY DISTRICT, ANDHRA PRADESH

*N.K. Sanghi**

Sustainability in agricultural production depends considerably upon proper development, conservation and use of natural resources at micro-level. It is now widely recognized those many of the available 'exogenous' technologies (emerging from formal research system) for management of above resources is not suitable for small holding situations. Critical evaluation of watershed development programme implemented during last 2-3 decades has shown that in majority of cases (where such technologies have been used with high external funding) the farmers have reverted to their earlier practices after the withdrawal of project support.

Realizing the above situation, a number of formal and informal researchers have started searching indigenous innovations to achieve sustainable development of land and water resources. The present paper is based upon a case study on the above aspect in Manchal watershed which lies in a semi-arid red soil tract of Telengana region having an annual rainfall of about 750 mm. The paper deals with distinguishing features as well as underlying principles behind indigenous innovations. It also analyses the relevance of these technologies and their implication on methodology as well as approach being adopted in the watershed programme.

Description of Indigenous Technologies

At the outset it may be appropriate to mention that indigenous technologies for Natural Resource Management (NRM) have been evolved through an informal research process. This is particularly true with respect to development and utilization of marginal lands, harvesting and utilization of runoff water, method of planting and seeding of new tree species etc. Many of the traditional practices particularly those, which relate to conservation of soil, continue to be relevant even today. Hence the term indigenous technology in the context of NRM includes

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the relevant traditional practices as well as new innovations, initiatives and ideas emerging through informal research system.

In the following paragraphs these technologies have been discussed separately for development of private land resource, common land resource and water resource. While describing these technologies a contrast has been made with exogenous technologies in order to have a better clarity regarding their distinguishing features. For the sake of convenience, the private land resource is divided into 3 parts namely cultivated land, fallow land and the land occupied under drainage course. Common land resource is divided into two types namely those which belong to forest department (where development is to be achieved through joint forest management) and those which are owned by other organizations (as discussed later on) where joint forest management or any other alternate approach can be used to develop perennial vegetation. Likewise water resource is divided into 2 parts namely runoff water and underground water.

Development of Private Land Resource

Cultivated land

The presently available exogenous technologies for cultivated land includes earthen bunds or vegetative barriers on contour / grade to achieve in-situ conservation of land resource. The indigenous technologies for this type of land consists of either stone bunding or earthen bunding with stone waste-weir (on a part of lower boundary of the field). The main purpose of this measure is not only to conserve land resource but also to achieve terracing of fields through natural leveling process (over a period of 10-15 years) by gradually increasing the height of stone bund / waste-weir as silt gets deposited on the lower side.

In red soils of this region no specific effort is made to construct new waterways. The surplus runoff in case of contour / graded bund is diverted into the existing natural water courses whereas in case of indigenous technology it flows from one field to another before joining the natural water courses.

Fallow land

The exogenous technology for fallow land is similar to that of cultivated land. The indigenous technology however varies depending upon the purpose for which the fallow land is proposed to be developed. If the land is to be used as pasture, investment on bunding is not made, as the existing grass cover is considered sufficient to take care of erosion hazard. If the land is to be used for crop production (which is generally the case) the investment is made first on

development of land resource (through removal of bushes and boulders) and then on conservation-cum-natural terracing measures indicated earlier. Fallow land is also developed either for forestry or rainfed horticulture. In such cases investment on land treatment is made for digging of trenches for conservation of moisture or for digging the pits to provide better environment for growth of trees / plants. Investment in fallow land is not made by all fallow land owners but only by those who propose to use the resource for cultivation of crops after its development.

Drainage course

Generally speaking this portion of land is considered to be a liability by outsiders. The exogenous technology in this case is used essentially to prevent its further degradation. The indigenous technology has however been designed to convert this piece of land into a productive asset.

The exogenous technology consists of a series of loose boulder checks throughout the gully course (in which the upper level of a particular structure is kept equal to the lower level of the previous structure in the gully course) so that bed erosion is prevented. The design of indigenous technology however varies depending upon the portion of the gully course where the structure is to be located. In upper portion of the gully course it consists of soil harvesting structures (made up of loose boulders) so that bed area gets gradually filled with soil and becomes a normal part of the main field. In middle and lower portion of the gully courses, the bed area is leveled into small terraces for cultivation of paddy crop.

In red soils of this region, many of the gully courses are having Jal land which suffers from water logging problem on account of lateral movement of water in the root zone due to the underlying hard pan. Innovative farmers carry out terracing in the bed area to use these Jal lands for cultivation of rainfed paddy crop. Some of the gully courses in normal lands are used essentially for safe disposal of runoff water. Farmers think that these courses are unnecessarily occupying a considerable area under the earthen walls on both the sides. Loss of this area is particularly felt by those farmers who have developed their adjoining fields for irrigated agriculture. Such farmers have preferred to replace the existing earthen side walls with masonry walls so that the area could be saved for productive purpose. For such structures farmers have willingly come forward to pay higher contribution (20 percent) than what is expected as per the present guidelines (5 percent).

Development of common land resource

Common land in a village may belong to any of the following organizations namely revenue department, forest department, village Panchayat, religious organizations etc. Under the present case study, almost all the common land belonged to forest department. The exogenous technology for development of perennial vegetation in the above land deals with plantation of new species whereas indigenous technology deals with natural regeneration of existing plant species. Social fencing is a common approach in both cases for protection against biotic interference. Under the project only a part of the area is to be developed each year on rotational basis so that social fencing could be facilitated conveniently.

The exogenous technology is based upon the concept of joint forest management which broadly includes choice of new plant species as per the preference of users; conservation of moisture through suitable land treatment (including staggered contour trenches); sharing of usufruct rights jointly by the community, forest department and forest protection committee; implementation of works through forest protection committee etc. The indigenous technology of natural regeneration requires essentially removal of unwanted shrubs; and singling of useful plants so that they could grow in a desired manner. This approach is adopted mainly in those fields where sufficient root stock of useful plants is existing.

Development of water resource

Harvesting of runoff water

In red soils of this region runoff is presently harvested for recharge of underground water resource so that wells could remain functional for a longer period. The exogenous technologies for this purpose consist of two types of measures namely cement gully checks and earthen percolation tanks. These measures are undoubtedly useful for increasing water table in the existing wells.

In this region irrigation tanks have been traditionally constructed (which can be observed in practically all villages) for cultivation of paddy crop through gravity flow. Additional construction of cement gully checks or percolation tanks indicated above often runs into conflict with the traditional irrigation tank system in the same village (as it reduces the flow of water in the existing tanks).

Recently innovative farmers have evolved an alternative measure to improve the recharge of their underground water resource. This measure consists of conversion of existing irrigation tank into percolation tank which leads to a significant

increase in the overall area under irrigation through better recharge of wells besides substantial increase in the production of fish from increased standing water in the bed area.

Farmers of this region have also evolved individual oriented water harvesting structures in the drainage course for providing supplemental irrigation. As discussed earlier, the gully bed area in jal land is terraced for cultivation of rainfed paddy crop. The sustainability in productivity of this crop is achieved through supplemental irrigation from the following two types of water harvesting structures within the gully course.

Seepage pond (generally constructed in the middle portion of the length of gully course) for providing required moisture to paddy crop in the lower field through sub-surface seepage Dug out pond (generally constructed in the lower portion of gully course which gets filled through sub-surface seepage from upper fields) for providing supplemental irrigation through manual lifting From some gullies the runoff water is diverted through low cost diversion structures for providing supplemental irrigation to the adjoining fields.

Exploitation of under ground water resource

In the red soils of Telangana region under ground water resource has traditionally been use through open wells. At present it is being used through deep bore wells. Since last 3-4 decades the underground water resource is getting over exploited resulting into heavy reduction in the water table. Due to this open wells as well as shallow bore wells are becoming non-functional where ever intensity of deep bore wells is increasing. This is resulting into lesser number of families using the underground water resource as compared to the earlier days when open wells used to be functional.

Under the watershed programme a high priority is being given to recharge the under ground water resource through various measures discussed earlier. It will be useful to see whether these efforts would lead to recharge of even open wells and promote equity in ownership of under ground resource by larger number of families.

TABLE – I : Description of exogenous and indigenous technologies for Development of land and water resources in red soil of Telengana Region

Sl. N.	Type of resource	Description of technologies	
		Exogenous	Indigenous
A	Private Land Resource		
	- Cultivated land	- Earthen bund or vegetative barrier on contour/grade	- Stone bund on a part of the lower field boundary - Earthen bund with stone waste weir on the lower field boundary
	- Fallow land	- Earthen bund or vegetative barrier as indicated above	- Removal of bushes / boulders - Stone bunding or earthen bunding with stone waste weir as indicated above
	- Drainage course	- Series of loose boulder checks	- Soil harvesting structures in the upper part of gully - Terracing of gully bed for cultivation of paddy - Replacement of earthen side walls with masonry walls in the lower part of the gully course
B.	Common Land Resource		
	- Forest department land	- Plantation of new plant species through joint forest management	- Natural regeneration of existing plant species
	- Revenue dept./ Panchayat	- Plantation of new plant species through joint forest management	- Natural regeneration of existing plant species
C	Water Resource		
	- Runoff water	- Cement gully check - Percolation tank	- Conversion of existing irrigation tank into percolation tank - Construction of diversion drains in the gully course for supplemental irrigation in adjoining fields - Construction of individual oriented water harvesting structures in gully courses having jal land - Repair of breached tank - Desilting in functional tank
	- Under ground water	- Bore well	- Open well

Underlying Principles Behind Indigenous Technologies

Field studies have clearly brought out that indigenous technologies are based upon different principles, which are specifically relevant to small holding situations. Some of these principles are discussed below to illustrate the point.

Enhancement of Productivity Besides Conservation of Land Resource

This is perhaps the most crucial distinguishing feature of indigenous technologies for management of land resource. The presently available exogenous technologies focus more on in-situ conservation of land resource with a view to achieve long term sustainability in production. The indigenous technologies on the other hand, focus on short term as well as long term increase in productivity. Because of this reason the motivation among farmers to adopt these technologies is relatively higher.

Smaller size of group action for conservation of land resource

Group action is a pre-requisite for implementation of soil conservation measures. The facilitation process for meeting this requirement becomes more difficult as the size of group action increases. The exogenous technology of contour / graded bunding requires a large size of group action among participating farmers before its implementation could start. On the other hand the boundary based soil conservation measures require a smaller size of group action between only the adjoining farmers. In low rainfall areas soil conservation measures can be implemented even on individual basis. Because of this it becomes easier not only to implement the measures but also to carry out subsequent maintenance.

Creation of micro-environments in gully courses

Indigenous technologies are based upon the concept of concentration of land resource (at appropriate place) rather than in-situ conservation of this resource at its original place. Soil harvesting structures as well as terracing of bed area in the gully course creates new pieces of field for cultivation of agricultural crop. The micro-environments created in the gully course (particularly in jal land) may have small but significant contribution towards sustainability of overall production over the vagaries of seasonal rainfall.

Relevance of Indigenous Technologies in the Present Context

By and large the traditional technologies for development and conservation of land resource are found to be highly relevant particularly for small holding

farmers. This is evident due to the fact that these measures are being implemented and maintained by farmers at their own cost. The percentage of their adoption is however limited; and the reasons for non-adoption vary from farmer to farmer. Lack of technological knowledge is not the main reason for non-adoption of soil conservation measures. Other reasons like limitation of finance, shortage of labour availability, lack of proper demarcation of field boundary, difficulty in facilitation of group action among neighbouring farmers, low motivation towards long term measures, low priority to rainfed agriculture etc. are major reasons which are adversely affecting the adoption of these technologies.

Likewise for harvesting of runoff water the indigenous technologies are found to be suitable but they are gradually becoming non-functional due to lack of proper maintenance. The existing operational arrangement has become non-functional after the responsibility for maintenance was taken over by the state. Although currently large investments are being made on construction of new types of water harvesting structures but adequate investment is not made either for construction of indigenous structures or for facilitating the maintenance of such structures.

Construction as well as maintenance of water harvesting structures requires regular group action among its users. Lack of group action becomes an important reason behind non-sustainability of both new as well as old structures. In the present watershed farmers have shown keen interest towards repair and maintenance of non-functional structures and also converting the existing irrigation tank into percolation tank. However lack of finance and inability to facilitate group action are found to be the main constraints in adoption of these technologies / measures.

IMPLICATIONS OF INDIGENOUS TECHNOLOGIES ON THE FUTURE WATERSHED PROGRAMME

New Roles for Outsiders

There are three types of major functions to be performed by outsiders for promoting proper development, conservation and use of natural resources. These include technical support, financial support and social facilitation (for group action, conflict resolution and equity). Until now outsiders have given major emphasis on providing technical support to the programme followed by financial support. Very little attention is paid to facilitate social action in the context of particular measure / structure to be constructed.

In view of the fact that in future indigenous technologies are likely to be promoted under watershed programme, the present role being played by outsiders may have to be re-examined. The case study has indicated that role of outsiders is likely to vary depending upon the type of measures to be adopted (table-2). In case of soil conservation measures the outsider may have a small role to play for providing technical support as well as social facilitation (if boundary based soil conservation measures are to be adopted). The role of providing financial support is relatively more important than the above two roles, yet it is of a medium level in itself (as compared to the high level of financial support being currently provided under the watershed programme).

In case of water harvesting structures, the technical support is expected to be of medium level (as compared to the current high level of support) because innovative farmers are also able to make important suggestions towards overall design and location of the structures. The financial support however needs to be continued at higher level (for community oriented structures). A striking change is needed in providing high level of support for social facilitation not only for planning and implementation but also for subsequent maintenance of the structures.

For natural regeneration of tree component in the common land, requirement of technical and financial input is of low level. However requirement of social input is of high level in order to facilitate social fencing as well as equitable sharing of usufruct in favour of resource poor families.

Thrust on replication of successful experiences

Watershed development programme is being implemented since last 3-4 decades in various parts of the country. Majority of the watersheds is funded by Govt. while some are funded by non government organizations. Besides this, individual watershed components are also being implemented by farming community without any external funding.

It may be appropriate to identify successful examples of watershed development within a particular region and put major thrust on replicating these examples rather than focusing the attention on new and unverified technological options for trial / demonstration. While replicating these successful examples required attention may be paid to the technical content, social context and participatory process with reference to the successful cases. A special attention may be paid to replicate community led success stories as these are likely to provide more sustainable results.

Investment of Public Funds on Indigenous Technologies

At present public funds are used mainly for exogenous technologies. The indigenous technologies are rarely funded even if lack of finance has been the major constraint in their adoption. In view of successful experience in favour of indigenous technologies, it would be appropriate to enhance investment of public funds on such technologies through appropriate policy and administrative decision.

TABLE – 2 : Role of outsiders for Development of Natural Resources through indigenous technologies

S.No.	Type of measures	Requirement of External Support		
		Technical	Financial	Social Facilitation
1	Soil conservation measures	Low	Medium	Low
2	Water harvesting structures	Medium	High	High
3	Natural regeneration of trees in common land	Low	Low	High

Attention Towards Repair and Maintenance of Water Harvesting Structures

For development of water resource at micro level, the current emphasis is only on construction of new water harvesting structures (using exogenous technological design). However repair and maintenance of existing indigenous water harvesting structures is hardly carried out under the ongoing watershed programme. Emphasis on this aspect would require not only financial assistance from outside but also a high level of facilitation for social action (related to group action and conflict resolution) among the concerned user group members. It may however be kept in view that external role for this purpose may be played in such a manner that it leads to sustainable results. Organization of a proper institution base at the village level and working out proper modality for contribution by users towards future maintenance of structures may be considered as a pre requisite to any external investment on water harvesting.

Flexibility in Sequence of Implementation

Ridge to valley is considered as a standard scientific approach for deciding the sequence regarding implementation of various measures. The rationale behind this approach is clear and sound. On the other hand it is also recognized that participation of people into the programme does not follow the sequence mentioned above. People take their own time to get motivated for implementation of works even for items which are highly relevant for them. Other compulsions and priorities are as crucial as the relevance of an intervention.

In view of this, appropriate flexibility may be introduced in the implementation of the programme. The experience with indigenous technologies (namely boundary based soil conservation measures, small size water harvesting structure in gully course etc.) has clearly revealed that such options can be implemented in a scattered manner throughout the watershed area (as and when the people get ready to participate) without rigidly following the ridge to valley concept. Such a flexibility would help in better participation of people.

Possibility of Improving the Financial Management Under Watershed Programme

At present watershed programme is highly subsidized through external funding. This is justified because it is a community oriented activity and also it has long term effects on sustainability of production. The above assumptions are true only when the programme is based on exogenous technologies. The indigenous technologies on the other hand leads to short term as well as long term increase in productivity and can be implemented on individual farmer or small group basis. This opens up a distinct possibility of improving the financial management in the watershed programme. To begin with the following four specific steps may be considered on experimental basis:

Higher Rate of Contribution from Farmers

At present watershed development measures are being implemented with very low or no contribution from farmers. This is one single factor, which is becoming a barrier in genuine participation of people in the programme. There are a number of examples in the NGO sector where farmers have gladly paid upto 50 percent contribution for watershed works provided they had a final say in the choice of technologies and manner of their implementation. Contrary to the common assumption contributory approach becomes a means of their empowerment rather than imposing a hardship on them.

Many of us have a fear that the programme would not be implemented at a faster rate if contribution rate is increased. While this may be true as long as there is a restriction on choice of technology. There are numerous community led successful examples where natural resources have been developed without any financial support from outside. If the focus is shifted towards replication of such technologies, there would be no difficulty in asking higher contribution from farmers.

Fixing Ceiling on Allocation of Funds for each Family

The exogenous technology requires a compact area approach with an assumption that the entire area falling within the watershed must be treated. This results in a heavy inequitable investment in favour of resource rich farmers as they own most of land as well as water resources. The above approach is not a requirement if indigenous technologies are used (as discussed earlier). For the sake of equity it may be advisable to fix a maximum ceiling regarding investment for each family particularly for those who possess large holdings, so that higher percentage of funds could be diverted for resource poor families.

Incremental Rate of Contribution from Resource Rich Families

In view of the fact that entire area within a watershed need not necessarily be treated under the project it may be appropriate to introduce the concept of incremental rate of contribution for those farmers where total investment is likely to exceed the ceiling amount. The higher rate of contribution may not become very discouraging for those farmers who propose to use the land and water resources for productive purpose after its development.

Linkage with Credit Institutions for Implementing Bankable Technologies

It is well recognized that many of the technologies in the community led success stories are cost effective even in the short run. These technologies are currently being used by a small percentage of families who have either better financial resource (to hire external labour) or who have availability of their own family labour (during lean periods). It would be worthwhile to link credit institutions with other farmers who are not falling within the above two categories and whose lands are not getting covered due to ceiling amount under the project.

Modification in the methodology for preparation and approval of technical plan

Under participatory approach preparation of detailed action plan is essential before funds are released to the community for its implementation. Conventionally the technical plans are prepared by junior level subject matter specialists and presented before the village community for their reaction. Afterwards these plans are sent to senior technical experts and administrators for final approval. There is a need to make major change in the above methodology if indigenous technologies are to receive due attention in the watershed programme.

Needless to mention that farmers have better understanding of indigenous technologies (for natural resource management) than the junior level subject matter specialists. Hence, the role of outside facilitators may be to arrange exposure visits of watershed community members to the successful examples (irrespective of their source of innovation) and then leave the decision about choice of technology / intervention to the concerned participants. For this purpose an open ended 'application form' may be designed and made available (on nominal cost basis) to each member or user group in the watershed village. Subsequently the role of watershed management committee and outside facilitators may be to collect and consolidate above proposals. The technical approval of consolidated action plan may be carried out at the village level in 2-3 rounds of the open meetings of the watershed association members. However, the financial and administrative approval of the action plan may be provided by the concerned institution who is funding the project.

Need to Discourage Digging of Private Deep Borewells

As discussed earlier the open wells are gradually becoming non-functional in villages where intensity of deep bore wells is increasing. On the other hand there is enough evidence that open well system could be revived if construction of new percolation structures is carried out nearer to the open wells in the watershed area. Ultimate functioning and effectiveness of these recharged wells would however be vitiated if deep bore wells are existing or dug in a nearby area. It is therefore essential to critically examine whether public sector support is justified in either digging of bore wells or construction of percolation structures nearer to bore wells without working out modality for equitable sharing of additional water resource developed through new percolation structures.

At this stage it may be worthwhile to raise a basic question, whether the private deep bore well system is sustainable and equitable. In case digging of bore wells seems to be inevitable under some situation, should these wells belong to individuals or to a group of members whose fields are located within its jurisdiction. Whether deep bore wells should be operated in all seasons and during all years or only in rainy season and during high rainfall years so that they do not unduly suck the water from nearby open wells. Could the concept of rationing of bore well water per family be worked out so that equitable use of the new resource can be facilitated even in situations where private deep bore wells are existing.



CYBER EXTENSION IN THE CONTEXT OF AGRICULTURAL EXTENSION IN INDIA

V.P. Sharma*

Access to information and improved communication is a crucial requirement for sustainable agricultural development. Modern communication technologies when applied to conditions in rural areas can help improve communication, increase participation, and disseminate information and share knowledge and skills. It is being said that “Cyber Extension” would be the major form of technology dissemination in the near future. However it is observed that the rural population still has difficulty in accessing crucial information in order to make timely decisions. It is essential that information availability is demand driven rather than supply driven. The challenge is not only to improve the accessibility of communication technology to the rural population but also to improve its relevance to local development.

The advent of INTERNET on communication scenario offers enormous potential for two-way on-line communication between distant parties via the telecommunication and computer network spread over the entire globe. The world is rapidly shrinking to a ‘global village’, which some courageously even call a ‘global family’. The merger of communication (audio and video) and computer technology has suddenly made this combination so powerful that no sector of human activity can afford to ignore it.

In United States most of the extension agents at the county level (equivalent to districts in India) have e-mail access. All the agents thus have electronic access to the university professors right at their work place. The use of e-mail has virtually replaced the paper mail communication between the university and the extension agents. At the county extension office and regional research stations of the university the Internet facility is available to all the staff. This trend is noticed in other developed countries as well. Electronic connectivity is creating a New World order. There is a growing recognition of information connectivity have’s and have-nots. The developing countries have to take note of this situation and prepare themselves at the earliest to join the new paradigm of economic and social development.

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According to Professor Frank Webster of University of Birmingham, “ In the new global society, there is very little any individual government can do to effect economic development at a macro level. What it can do is educate its citizenry in information technologies so that they have a better than average opportunity to prosper and take advantage of the new global economy. Societies that manufacture the most educated citizenry will create infrastructure for the most prosperous economies. For that reason the Prime Minister of U.K. is focussing on education, but so too is the Chief Minister of Andhra Pradesh, the Governor of New York State and a thousand other leaders through the world.” (Price Monroe E. 1999).

Improved communication and information access is directly related to social and economic development. However it is observed that the rural population still have difficulty in accessing crucial information in forms they can understand in order to make timely decisions. There is a concern that the gap between the information rich and information poor is getting wider. New information and communication technologies are generating possibilities to solve problems of rural poverty, inequality, and giving an opportunity to bridge the gap between information-rich and information-poor and support sustainable development in rural and agricultural communities.

The ongoing IT revolution has opened huge opportunities for providing access to information as well as to interactive distance learning in rural India. Computer aided knowledge dissemination mechanism help to reach the un-reached and foster new voices and new leaders. The pilot projects of “ Warna Wired Villages” in Kolhapur, Sangli district of Maharashtra and “Info Villages” in Pondicherry have successfully demonstrated the acceptability and usage of high-end information and communication connectivity at village level. Any effort in this direction will be highly effective way to empower the rural population with the most needed commodity that is INFORMATION.

“The Internet subscribers base of Videsh Sanchar Nigam Limited (VSNL) increased from 4151 in 1995-96 to 213,048 in 1998-99. In year 1998-99 alone the total subscriber’s base in the country has grown over 185% to 254000 till March 1999, added by opening up of this to private players. INFAC projections indicate that Internet subscribers base would grow at compound annual growth rate (CAGR) of about 110% to reach 1.75 million in 2002-03 (Economic Times, July 1, 1999). China is having 2.1 million users out of 1.2 billion population. Project Venus, being initiated by Microsoft Cooperation in China w.e.f. December 1999 proposes to connect the 3.2 million TV users in China on Internet, to leap frog almost overnight on to info super highway to give access to entertainment,

education and communication technology in Chinese language on an ordinary TV set (Time Magazine, April 19, 1999). According to Mr. Hwang Eui-Hwan, Director, Technology Standards Division, Ministry of Information and Communications, Republic of Korea, the Government of republic of Korea has drawn up an ambitious plan titled “Cyber Korea-2000” to utilize information technology to overcome the down turn in its economy as part of Asian Economic crisis (ESCAP Report 22-28 April, 1999). By year 2001 nearly 41% of US population will be online, compared to only 13% in Europe. The situation in developing countries is far worse. The percentages of Internet hosts in various countries are given in table below:

Table 1: Number and Percentage of Internet Hosts¹ -

Sl. No.	Country	Hosts	% of Total
1.	U.S.A.	8,224,279	51.0
2.	U.K.	579,492	3.6
3.	Germany	548,168	3.4
4.	Japan	496,427	3.0
5.	Australia	397,460	2.5
6.	Finland	277,207	1.7
7.	Netherlands	214,704	1.3
8.	France	189,786	1.0
9.	Sweden	186,312	1.0

India has less than 1 million hosts in the country; these are also primarily in higher educational institutions and national and multinational corporate sectors. Considering the importance being given by other developed and developing countries on increasing information access to common people there is a strong case for government intervention to upgrade information highway capacity in the country. The constitution of Information Technology (IT) Task Force by Government of India and subsequent acceptance of its main recommendations is a

very positive step in this direction. The three objectives towards which the IT task force has really focussed are: to create a world class information structure, create a policy ambience to enable Indian IT industry to target a \$50 billion annual export of software and to increase the penetration of PCs in India from the current level of 1 for 500 to 1 for 50. This is not really impossible. Given the political will, which is very positive at present and the high percentage of IT literate people in the country, this task can be achieved within the stipulated time frame of 8-10 years i.e. by the year 2008. Agriculture has got a little less emphasis in the task force recommendations. There is only one recommendation out of 108, which focuses on agriculture. This is recommendation no. 79. The same is reproduced below:

According to the IT Task Force recommendations “ The Government shall take all necessary steps to boost IT for agriculture and integrated rural development. Towards this end, a number of demonstration projects will be devised in each state taking into account the specific strengths and needs at local level. A unique “wired village” pilot project has been launched under the aegis of National Information Technology Task Force at the Warna Nagar Cooperative Complex in Kolhapur District in Maharashtra. Efforts will be made to quickly replicate such projects in other states”.

Needs of agriculture are much more than one gets out of this proposal of so called project. To sustain self-sufficiency in food, it is essential that the farming society becomes the most wired society. One should be able to really project that by year 2008 any farmer in a remote village can on demand get the following information by accessing hierarchy of information basis:

1. cropping strategy for farmer fields based on integrated information on soil, weather, fertilizer and pest management models;
2. how and where to get proper seeds on nursery plants;
3. Prevailing prices of various farm equipment and products and series of such set of information, which can lead to most efficient yield and optimum cost benefit to the farmer.

One would like in an ideal situation the following to happen:

1. an agriculture information centre in each village;
2. interactive exchange of information for planning and day to day operations by farmer ;
3. Availability of all the extension services on demand.

Harnessing IT for Agriculture and Rural Development: Indian Scenario:

There are cases of application of information and communication technologies that have made a difference in the delivery of services in rural India. Some of these include the Warna Wired village Project in Maharashtra; Milk collection in dairy co-operatives (National dairy Development Board); Information Villages Project (MS Swaminathan Research Foundation-International Development Research Centre); Information Technology application for Indian Rural Postal System (CMC Limited, Hyderabad); Knowledge Network for grassroots innovations (IIM, Ahmedabad); Application of Satellite Communication for Training Field Workers and Extension Workers in Rural Areas(ISRO); Computerization of Mandal Revenue Offices (MROs) and computer aided administration of revenue department in Andhra Pradesh (Government of Andhra Pradesh.)

- In the **Warna Wired Village Project** covering 70 villages in Maharashtra the existing cooperative structure has been used with state of the art infrastructure to provide Internet access to cooperative societies. The aim is to provide information to villagers by establishing networked booths in the villages.
- The **Information Villages Project** of the MS Swaminathan Research Foundation is aimed at bringing the benefits of modern information and communication technologies to rural families in Pondicherry. A Value Addition Centre, which is the hub of the information network, has been established in Villianur village and four information shops have been established in different villages.
- **National Dairy Development Board.** IT-based machines are being used at milk collection centres, and in cooperatives to measure butter/ fat content of milk, test the quality of milk, and promptly make payment to the farmers. It has resulted in the removal of incentives to cut the milk by adding water, reduced time for payments from 10 days to less than five minutes, and instilled confidence in farmers in the cooperative set up. All of these factors have helped the milk market to expand.
- A CMC pilot project has installed a **Computerized Universal Postal System and a Centralized Accounting and Reporting System** in three post offices in Andhra Pradesh. The technology is designed for rural environments. The systems handle multifunction within a postal office, reduce errors and waiting time, and provide transparent transactions.

- One way video, two way audio teleconferencing interactive networks have been used for education and training by **Indian Space Research Organization**. The major application of the network in rural development was for training extension staff from various departments of the state governments. In addition, a large number of women, Panchayati Raj elected officials, primary school teachers, and child development workers spread over large distances have been trained.
- The **AP State Wide Area Network (APSWAN)**, aims to link the state government's Secretariat with 23 District Headquarters, serving as the backbone for "multimedia-services" (voice, video, and data) that would be used for improved co-ordination between state headquarters and district offices in managing various regulatory, developmental, and hazard mitigation programs of the state government. Mandals will be served by this two-way communication, and electronic commerce applications will be developed. The **AP Value Added Network Services project** hopes to deliver a variety of public services through a large network of information kiosks.
- The **Computer-aided Administration of Registration Department (CARD)**, a project of A.P. aims to introduce a transparent system of property valuation, which is easily accessible to citizens.

The Context of Agricultural Extension in India:

In independent India the Agriculture and rural development was taken on priority basis for systematic development. Community Development Scheme was initiated in 1952. The Agricultural Extension system started in 1953 with National Extension Service (NES), encompassing the whole country into the realm of activities in agriculture, animal husbandry and rural welfare. A three tier administrative structure at district, block and village level took shape in all the states in which administrative control rested at district and technical expertise at the block level. A field level force of village level workers (VLWs) was put into service under subject matter specialists (SMSs) in each block. The responsibility of coordination rested with Block Development Officer (BDO). Since the inception of NES, both extensive and intensive approaches were followed but due to scarce resources dispersed over large areas in the initial stage, much progress could not be made in raising production. Hence, the Intensive Agricultural District Programme (IADP) and Intensive Agricultural Area Programme (IAAP) were introduced in 1960 and 1966 respectively. In order to give added attention Research based Extension Methodology National Demonstration Programmes were launched in 1965 and Lab to Land Programmes (LLPs) were

introduced by Indian Council of Agricultural Research (ICAR) in 1979. The Training and Visit (T&V) system, introduced in 1977 on pilot basis, but later extended to 26 states of the country by 1985, was the first major programme which focussed on Agricultural Extension and defined the role of Village Extension Worker (VEW) to concentrate only on extension only.

The trend thus, till 1980s, had been to focus the Extension system on Agriculture and more specifically to important crops of the concerned area. During the past 2 decades, the work of the extension services has often become more diversified, the demand on the extension functionaries are growing as the Agriculture is becoming more specialized, commercial and on the other hand integration of other enterprises like livestock, horticulture, sericulture in the farming systems. Agricultural Extension in the current context has become recognized as an essential mechanism for delivering information and advice as an input into modern farming (Gwyn E. Jones 1997). The extension is now becoming more diversified, more technology intensive and more demand driven. This requires the Extension Worker at the cutting edge level to be master of so many trades, which is well nigh impossible. The use of Information Technology can help the extension workers to be more effective in meeting farmers information needs.

Limitations of Traditional Extension Methods:

Before one can appreciate the question of what really makes cyber extension necessary it may be helpful to take look at some of the limitations of traditional extension techniques and processes:

1. **Traditional Extension is expensive:** it costs a lot of money to produce and print extension messages / brochures. It is also expensive to train a whole chain of extension personnel (right from district level, sub divisional level, at block level to village level extension worker) to understand the new technology and to answer the possible queries from farmers.
2. **Traditional Extension is very time consuming process:** for a message to pass from university / zonal research station (ZRS) / Krishi Vigyan Kendra (KVK) to farmer, it takes many actors to understand the same and deliver it to next layer. This process takes a lot of time and effort on part of extension machinery of the state.
3. **In Traditional Extension the quality of messages gets eroded as it passes through different layers:** a number of evaluation studies

of Training and Visit (T&V) system indicate that the quality of extension messages gets heavily eroded when it reaches the farmers.

4. Poor Communication Capacity of existing extension systems: Most technical staff within the line departments lack the capacity to effectively communicate with both, the research system and the stakeholders group. Firstly, the flow of the information from research to extension tends to be top-down, rather than a two-way, interactive process aimed at identifying and solving serious problems. Secondly there is little use of up-to-date communications technology, including the use of electronic communication to improve feedback and technical support between research and extension personnel, and to facilitate administrative communication.

It is thus found that the capacity of traditional extension system is very limited, and the challenge in terms of reaching all the villages and all the farmers is becoming more and more difficult to meet. It is observed that the farmers are more dependent on other than public extension system for getting technical advice as well as farming inputs. A visual presentation of the strength of linkages among various extension agencies to the farmer is given at figure –1 on the next page. It is noted that the linkage between farmers and Block Development Officer / Agriculture Officer is poor as compared with the linkage between farmers and traders- market / seed suppliers and Farmers and Television / Radio.

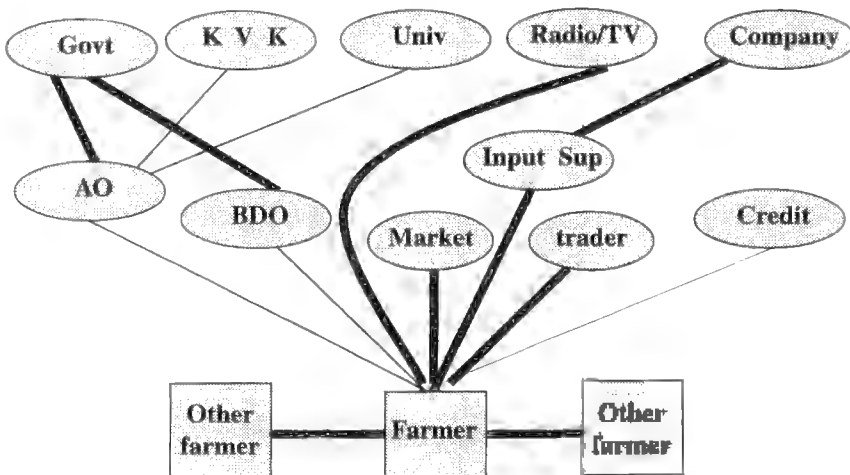


Figure-1: Information Linkages between Farmer and other Agencies.

What is Cyber Extension?

Cyber Space is the imaginary or Virtual space of computers connected with each other on Networks, across the globe. These computers can access information in form of Text, Graphics, audio, video and animation files. Software tools on networks provide facilities to interactively access the information from connected servers. The cyber space thus can be defined as the imaginary space behind the interconnected telecommunications and computer networks, the virtual world.

Agricultural Extension, according to Dr. D. Benor, “ relates to the process of carrying the technology of scientific agriculture to the farmer in order to enable him to utilize the knowledge and a better economy. Agriculture extension service seeks to impart the necessary skills to the farmers for undertaking improved agricultural operations, to make available to them timely information improved practices in an easily understandable form suited to their level of literacy and awareness, and to create in them a favorable attitude for innovation and change” (Benor et. al 1984). Thus Extension is central mechanism in the agricultural development process, both in terms of technology transfer and human resources development (Samanta, 1993).

Cyber Extension *thus can be defined as the Extension over Cyber Space.* Cyber Extension means “using the power of online networks, computer communications and digital interactive multimedia to facilitate dissemination of agricultural technology”. Cyber Extension include effective use of Information and Communication technology, national and international information Networks, Internet, Expert Systems, Multimedia Learning Systems and Computer based training systems to improve information access to the Farmers, Extension Workers, Research Scientists and Extension Managers. According to Mishra 1999, Cyber Extension may be defined as extension over the cyberspace, the imaginary space behind the interconnected telecommunication and computer-networks, the virtual world.

Extension has a communication dimension (Misra 1990). Certain unique features of communication in cyber space should therefore be noted: (I) access to the astounding store-house of information is free, (ii) the information is available instantaneously round the year and twenty four hours a day, (iii) communication can also be interactive (through e-mail, discussion groups, newsgroups), (iv) the information is available from any point on the globe (subject to availability of accessible technology like computer, modem, telephone line etc.), and (v) the

communication is dynamic and ever growing.

Important Tools of Cyber Extension:

The important tools of cyber extension include:

1. E-mail
2. Telnet
3. FTP
4. Gopher, Archie, Veronica
5. Usenet Newsgroups
6. World Wide Web

1. E-Mail:

E-mail (electronic mail) is the most frequently used application in the cyber extension. Currently is being used by over 50 million people for business and personal use. E-mail allows us to send and receive text messages to other users of the Internet. For many people e-mail is the only Internet application used. E-mail can be send /read using a number of tools. Some are fee programmes, some are free and some are shareware. Some of the well known e-mail tools are: Web Browsers like Netscape, Internet Explorer etc., Lotus Notes, Eudora etc. e-mail addresses are of the syntax: mailbox@domain, e.g. vpsharma@hd2.vsnl.net.in, manage74@hotmail.com, dgmanage@hd1.vsnl.net.in etc. To send an e-mail you have to naturally know the receiver's e-mail address. The easiest way to find someone's e-mail address is to ask him/ her. There are some e-mail locating sites available on the Web, but <http://www.four11.com> is widely recognized as one of the best. Four-11 uses three techniques to 'discover' addresses:

- First, interested individuals can complete a form at the four-11 site to have themselves registered;
- Second, Usenet newsgroups posts are scanned to match names with e-mail addresses;
- Third , some Internet Service Providers (ISPs) automatically send registration information to Four-11 when they sign up new members;

If you do not want your address listed with Four-11, you may ask that your entry be deleted.

2. Telnet:

Telnet is an application that allows you to log on to a remote computer. It is like a terminal emulation programme. Telnet sessions present text based data as a terminal would. However now GUI (Graphic User Interface) clients are now available which offer better service. Before the advent of World Wide Web (WWW) the telnet sessions were very common, but now most of the organizations use web sites for applications such as this.

3. FTP (File Transfer Protocol):

FTP use to send copies of files from one computer to another and is responsible for highest percentage of data transferred on Internet. FTP transfers can either through “anonymous” connection or by password protected ID. Command line and graphic user interfaces are also available.

4. Gopher, Archie, Veronica:

Gopher was the first attempt of making it easy to access resources on the Internet. As recently as in 1994, Gopher was considered the most useful Internet tool. Gopher uses text based nested menus to access FTP sites, directories, files and documents. Gopher was designed by computer scientists at the University of Minnesota. Gopher sites did a good job of organizing FTP sites, but it did not take long before the number of Gopher sites was unmanageable. Archie, Veronica, Jughead, and other sites were all developed to assist with finding the right Gopher site. Gopher and its derivatives have been largely made obsolete by the search engines available on the web today. Web clients can handle Gopher transactions, and in fact a user is offered link to a Gopher site without realizing it.

5. Usenet Newsgroups:

More than 20,000 Usenet Newsgroup categories are currently organized which cover almost any imaginable area of interest. Newsgroups provide a bulletin board type area where users can read other opinions and are sent entries of their own to be posted. Modern web browsers like Netscape and Explorer include software for reading and posting to Usenet. Email mailing lists are an alternative for Usenet groups as these lists are normally more focussed.

6. World Wide Web (WWW):

The World Wide Web has become so popular that it has almost replaced

all the above Internet tools and is slowly becoming synonymous Internet. The web is the most popular place to be on the Internet. This is what has brought the masses to the Internet. What is World Wide Web (WWW)? WWW is an organization of hypertext documents containing text, images, animation, sound, video and increasingly interactive programmes. WWW is an easy to use interface and hundreds of thousand sites prepared by school children too multimillion-dollar companies are there on the web. Almost all the universities across the globe are having their presence at WWW. The web is truly worldwide. As simple mouse click can easily transport you from a server in India to one in North America or to one in Europe or Australia, and even Antarctica. The web is more than static text documents. An endless variety of images, sounds, videos and multimedia applications are used to present information. The World Wide Web is called what is because sites around the world can be accessed, and because documents seem to stretch web like through endless hyper links.

The WWW is thus the most important tool of cyber extension. The web sites hosting a particular institution or organizations are searched and browsed through search engines and several of them are available. Some 320 million web pages are currently are online. Search engines are required to wade through this vast mass of information and cull out the required information. The best way to access a web site, however is to know its address technically known as uniform resource locator (URL). Once a URL is known the web site can be accessed directly. Some of the important URLs on agricultural extension are, <http://www.cornell.edu>, <http://www.msu.edu>, <http://www.ag.arizona.edu/aeb/aiaee/journal.html>, <http://www-esd.worldbank.org/extension>. Browsing through search engines of Microsoft Network (MSN) - 60,366 web pages were found on subject of **agricultural extension**. On another search engine infoseek at <http://www.infoseek.com>, 5,457,653 web pages were found on the same subject (as on 8th July 1999, 11 AM). Most of the web pages are common on the search engines, and majority of them belongs to universities in United States. As reported earlier in this paper, over 50% of world's Internet sites are in US and hence the technical material also is mostly available from US sites. The Indian presence on web is very meager, however it is increasing at a good pace. Most of the ICAR institutions are in process of developing web sites and it is expected that by 1999-2000 all the ICAR national institutes, National Research Centres (NRCs), Project Directorates (PDs), State Agricultural Universities (SAUs) and Directorate of Extension (DOE) will have their own web sites. National Institute of Agricultural Extension Management (MANAGE) and National Institute of Rural

Development (NIRD) have already hosted their web site with URL <http://www.manageagri.com/> and <http://www.nird.com/>. More and more extension information is expected to be on the web in very near future. The packaging and hosting of technical extension material and establishing connectivity at Krishi Vigyan Kendras (KVKs), District Agricultural Officers (DAOs), District Rural Development Agency (DRDAs) and other participating agencies has to be taken up side by side. Only then we can harness the true potential of cyber extension.

The methods for cyber extension:

The World Wide Web can help the extension world wide in the following ways:

- (i) Providing interaction among research scientists, extension workers, farmers and other rural people through e-mail;
- (ii) Providing up-to-date news and information services, such as market prices and weather conditions;
- (iii) A question and answer service among Scientists, Extension Functionaries and Farmers, where experts respond to queries on specialized subjects;
- (iv) Creation and maintenance of Statistical Databases on critical agricultural and rural development parameters that can be queried on demand;
- (v) Providing the details of Poverty Alleviation Schemes on the Internet;
- (vi) Providing status of various Government Programmes and details about their implementation mechanism on demand basis;
- (vii) Hosting web sites by major institutions participating in agricultural extension, putting latest packages of practices (with more situation specific packages), for various agro-eco regions. These institutions, particularly the Project Directorates may also place the diagnostic and pre-emptive farm practices for the major crops particularly the commercial crops, well in advance of the concerned crop season. This can help the extension workers to access latest information on IPM (Integrated Pest Management), INM (Integrated Nutrients Management) and other such practices for high value important commercial crops. The institutions will also be able to get direct customer feedback for their packages.
- (viii) Launching online rural development and extension journals, newsletters etc. (with or without print version);

- (ix) Providing Internet access at district and block level agriculture and rural development offices. This service may also be open for rural communities on fixed days. This connectivity can also be used to download online publications on useful topics from anywhere in the world;
- (x) Opening of cyber cafes to enable educated rural people and extension workers at village level to have direct access to world wide web for having market information etc.;
- (xi) Providing maps that display different features, such as population density, crops planted, etc.;
- (xii) Providing video clips to demonstrate complex procedures; and audio files for re-broadcast on local radio stations (FAO, 1999);
- (xiii) Providing mechanism of user / beneficiary feed back for the Public Sector Schemes.

The cyber extension thus can be used as a complement in conjunction with existing extension and rural development mechanism. The cyber extension naturally, cannot and will not eliminate all the problems of the existing programmes and schemes. And in most cases, cyber extension will not even replace the traditional extension. Instead, it will both add to and subtract from today's extension methodology. It will add more interactivity. It will add speed. It will add two-way communication. It will add to wider age and also more in-depth messaging. It will widen the scope of extension; it will also improve quality. It will subtract costs, reduce time. It will reduce dependency on so many actors in the chain of extension system, and frankly it will change the whole method of extension in coming decade. " The continuing rapid development of telecommunications and computer-based information technology (IT) is probably the biggest factor for change in extension, one which will facilitate and reinforce other changes. There are many possibilities for the potential applications of the technology in agricultural extension (FAO, 1993; Zipp, 1994). IT will bring new information services to rural areas which farmers, as users, will have much greater control than over current information channels. Even if every farmer does not have a computer terminal, these could become readily available at local information resource centres, with computers carrying expert systems to help farmers to make decisions. However, it will not make extension worker redundant. Rather, they will be able to concentrate on tasks and services where human interaction is essential – in helping farmers individually and in small groups to diagnose problems, to interpret data, and to apply their meaning (Leeuwis, 1993).

The need for agricultural and rural information and advisory services is likely to intensify in the foreseeable future. The experiences of “ Info Village Project” in Pondicherry by M.S. Swaminathan Research Foundation and “Warna Wired Villages” in Maharashtra in India have conclusively demonstrated that if the information is available at the door step farmers are willing to pay and make use of extension information, marketing information. It has been demonstrated by these initiatives that the villagers can manage these information centres themselves. At one of the villages (Embalam), under “ Info Village Project” in Pondicherry four village-women, who have studied up to only class IX are managing the Information Centre effectively. They are able to send and receive e-mail, Fax to/from the main hub at Villianur and also to MSSRF headquarters at Chennai. They download the daily news from the main hub and display at their Bulletin Board, put outside their info centre. The establishment of Farmers Information and Advisory Centre (FIACs) at the block level in the 6 pilot districts under the National Agricultural Technology Project (NATP) is an indication of the shape of the things to come in the future.

Lessons Learnt from the Success Stories of “ Warna Wired Villages” and “ Info Villages Project”:

Some key features, which were found to be common in the two projects, are those, both the projects are highly user friendly, demand driven and local people managed. Hence it is suggested that while designing an IT based programme for rural communities care must be taken to ensure that the programme is:

- People managed
 - Demand driven
 - Caters to all community members including women and youth
- Content should have local relevance
- Content should reflect Value addition
 - Content should be in the local language
 - Facilitating rather than encyclopedic
 - information that makes a difference is one that is useful in directing local activities

Potential Advantages of Cyber Extension:

1. **Cyber Extension will save money, time and effort:** scientists will prepare electronic version of messages themselves. These versions don't have to be printed and posted. This will save money and time. Cyber messages will be updated online and that saves time too. Cyber extension can provide more in-depth analysis and can also provide detailed on-farm research results to the curious users / farmers.
2. **Cyber Extension will save time, cut steps from extension process:** Cyber Extension will remove a number of steps altogether from the traditional extension process. In the context of Agriculture, the zonal workshops and training to subject matter specialists (SMS) can be eliminated altogether. All the concerned will get the information immediately and queries / clarifications will also be addressed equally fast, without involving a chain of extension machinery.
3. **Cyber Extension will be information rich and interactive:** It appeals to the curious extension workers and analytical farmers. It will allow them to search and locate the information they need quickly. The extension workers can talk to the concerned scientists for more information on the subject, wherever the scientists may be. The rural technologies can be made available on CD-ROMs for quicker dissemination.
4. **Cyber Extension will offer instant international reach:** Online networks have created an instant global village. Cyber extension will eliminate the time and distance barrier that get in the way of knowing the latest information on any particular problem from any part of the world.
5. **Cyber Extension will be continuously available:** One of the key attributes of an online information service is that it is available all the time, 24 hours a day, 365 days a year. Your cyber extension functionary doesn't sleep; he doesn't go on leave. If you have connectivity, you can get information, from wherever it is available.

Now it is the job of scientists particularly the extension professionals to collate, edit and package the technical information and put it on the net. The national, regional and state level institutes like NIRD /MANAGE / State Institutes of Rural Development (SIRDs) /State Agricultural Management and Extension Training Institutes (SAMETIs) / KVKs / ZRS / SAUs have a very important role to play in taking lead to package the information on Agricultural Extension and Rural Development Policies, schemes, programmes and working mechanism at the grass-

root level and host the same on their WEB sites. We need to facilitate the task of taking the information access to the village level. There is already a concern that the gap between the information rich and information poor is getting wider. Hence it is incumbent on all of us, the administrators, Non Government Organisations (working for Rural Sector), trainers and scientists, all who are involved in the task of facilitating the upliftment of the rural communities to provide information access to the last person in the rural areas: Reaching the un-reached.

References:

- Benor et al. (1984). Training and Visit Extension, A World Bank Publication 1984. P-138
- FAO (1993). The Potentials of Microcomputers in support of Agricultural extension, education and training. Rome: FAO.
- FAO (1999). Virtual Extension Research Communication, on <http://www.fao.org/WAICENT/vercon/> as on July 8'1999. Rome: FAO.
- Gwyn E. Jones (1997) The History, Development, and Future of Agricultural Extension in Improving Agricultural Extension – A Reference Manual Edited by Burton E. Swanson et al. FAO Rome 1997
- ICAR (1998) - Information Systems Development: Development strategies and implementation plans under NATP ICAR 1998.
- Javed Jabbar (1999). *The observations in first plenary session of Asia Information Poor to Information Rich : Strategies for 21st century*, Chennai on July 1, 1999 by Mr. Javed Jabbar, founder Chairman, South Asia Media Association and former Minister / Senator of Pakistan.
- Leeuwis, C. (1993). *Of Computers, myths and modeling: The social construction of diversity, knowledge, information and communication technologies in Dutch horticulture and agricultural extension*. Wageningen Studies in Sociology, 36. Wageningen: Agricultural University.
- Maunder, A.H. (1973). Agricultural Extension: A Reference Manual (Abridged edition). Rome: FAO.
- Price Monroe E. (1999). *Research for Strategies for 21st Century*, Dr. Price Monroe E, Director, Centre for Socio-legal studies, Wolfson College, University of Oxford, UK, paper presented at AMIC, 8th Conference July 1-3, 1999.

- Samanta R.K. (1993). *Extension Strategy for Agricultural Development in 21st Century*. Mittal Publications Delhi.
- Zipp, W. (1994). *Improving the Transfer and use of agricultural information: A guide to Information Technology*. World Bank Discussion Paper 247. Washington DC: The World Bank.

HUMAN RESOURCE MANAGEMENT AND ORGANISATIONAL EFFECTIVENESS

*Vikram Singh**

Although human resource management has been in existence since ages, only recently there has been some major redirection in thought concerning its importance as a discipline to the effectiveness of the organization. During feudalistic era the human resource management was mostly around the relationship of owner and the servant, in the industrial era it was of owner and blue collar worker and in the information era it is the management of knowledge worker and therefore the approaches which has been in vogue in past to manage servants and workers has to transform to manage a knowledge worker. It is in this context where paradigm shift in the approach of a manager has to take place to manage his men in the organization. The focus of this paper is not merely to articulate the academic significance of various human resource management processes but also to enable the managers to apply them in live situation based on sound behavioural and management principles.

This new perspective is that of strategic human resource management. This perspective essentially takes a broader and more integrated view of the personnel function to the longer-term strategies of the organization and ask how the personnel function can facilitate the accomplishment of those strategies.

Human resource management may be defined as a process by which people with diversified goals are motivated to match themselves with the goals of the organization.

Human resource management is required in the organization to produce key results in term of productivity, profit, creativity, innovation, services, satisfaction etc.,

The delivery of these key result areas would heavily depend on various processes like decision making, use of authority, use of strengths of colleagues and subordinates, position and professional conflict management, stakeholders management, motivation management pattern, etc.,

Each of these factors are further discussed as what they mean and what skills a manager require to apply them, ultimately resulting in effective delivery on key result areas.

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A - Decision Making

'To quit MBA or not in Harvard Business School was the dilemma faced by Bill Gates. A timely and effective decision to quite MBA and allot the time for making software programmes has paved the way for Bill Gates to become the richest man in the world. This is to show the importance of decision making, which not only change the lives of individuals but also that of the organization.

Decision making is the process of i) identifying the problem ii) defining and setting aims, iii) formulating the alternatives, iv) evaluating and choosing the best alternative v) implementing the choice vi) commitment for action and vii) following it up.

Identify the Problem

Problem is an existing negative state requires redressal and not the absence of the solution, which is understood this way quite often. A manager need to identify the existing focal problem based upon available information and brain storming with the members of the organization or decision-makers. It is always advisable to workout a cause and effect network around the problem so that all the members of the organization can understand and reflect to convert the problem into an actionable task statement.

Aim Setting

'Aims' is a useful collective term embracing goals, targets, objectives, purposes, intentions, aspirations, standards, ambitions, ideals, mission, all of which relate to the direction we wish to take or the future we want, or need to bring about. The setting of aims calls upon the skills of imagination and foresight. The manager should have the skill of knowing whether they are given, self evident, to be deduced evolved or latent.

It is the clarity of aims, which provides a manager the basis for decision and ways and means of realizing the decision. People in the organization also like to know why they are being asked to do things. And therefore sharing a common goal and vision is the requirement to ensure peoples' contribution in a focussed manner.

Questions, which help clarify aims include:

Why is the task being done?

Who or what is it for?

What benefits will it lead to?

What use will it be?

Establishing aims is a forward-looking activity requiring vision imagination, so it is worth remembering that the answers to the question ‘why?’ will fall into two categories Those which describe the future (purposes), often phrased ‘to so that...., in order to’, those which describe past events and give background (reasons), often phrased ‘because.....’

Formulating Alternatives

This is the stage where all the alternative solutions and courses of actions can be used by a manager to achieve the aims. The solutions of the problem can be generated by asking the question ‘how’?

Evaluating Alternatives

As all the possible alternative may not be equally feasible the best among them must be identified. Some may be more effective than the others and some may be difficult to implement and therefore the manager need to assess the implication of each of these alternatives. The following criteria may be useful to choose the most feasible alternative.

TECHNICAL

- Appropriateness, use of Local Resources, Market Stability etc.,

FINANCIAL

- Costs, Financial sustainability, etc.,

INSTITUTIONAL

- Capacity, Capability, Technical Assistance, Inputs, etc.,

SOCIAL

- Distribution of costs and benefits, gender issues, socio-cultural constraints local involvement, Motivation, etc.,

ENVIRONMENTAL

- Environmental effects, environmental costs and benefits

TIME HORIZON	-	How long it will take to achieve the objectives
CHANGES OF SUCCESS	-	High, Medium, Low
RISK	-	High, Medium, Low

Implementing the Choice

The choice that has been selected, needs to put into action to solve the problem and monitor the effectiveness of the decision.

Stakeholder Analysis and Management

It has been our experience that the developmental programs do not succeed unless they are related to the needs of the people, addressing their problems, within their available resources on a sustainable basis. Therefore, the greater emphasis of late has been on participatory developmental efforts in partnership with people community. To realize this process in letter and spirit a manager can effectively make use of the understanding of concept of stakeholder and their management for over all designing and implementation of any developmental programme. Stakeholder analysis and management explained in the following paragraphs may be used as a mechanism to ensure peoples participation and partnership in the developmental efforts. If a manager is equipped with this skill any developmental programme is quite likely to produce result on time, of expected quality and at a reasonable cost.

What is Stakeholder?

Persons, Groups, Institutions with interest in the project or activity are stakeholders. They may be winners, losers, affected, involved, and excluded in decision making.

Types

Stakeholders may be determined by extent and nature of affect they have on activity or project.

PRIMARY stakeholder are one's who are ultimately affected + vely or -vely (beneficiaries / advisories)

SECONDARY stakeholder are the intermediaries in the aid delivery process (NGO/Private sector / Funding, implementing, monitoring, advocacy agencies/ Govt.)

Purpose of Stakeholder Analysis and Management

To know

1. the ways in which these interests affect Project Risking and Viability
2. The possible relationships of manager with stakeholder at an appropriate stage of the project for coalition / sponsorship / ownership / cooperation etc., in order to take advantage for the success for the activity / project.

Steps for Stakeholder Analysis

- 1 Identify and list stakeholder in terms of supporters or opponents / female / users / occupational groups / income groups /vulnerable groups / likelihood of emergence of new stakeholder as a result of project.
- 2 Identify interest overt and covert vis-à-vis problems. (In terms of stakeholder's expectations, benefits, conflicts with the project, how does stakeholders regard other stakeholders.
- 3 Briefly assess the likely impact on the project of each of these (+ve / -ve / uncertain / unknown) interest of the stakeholders.
- 4 Indicate relative priority, project gives to the interests of stakeholder

Stakeholder Worksheet

STAKEHOLDER	INTEREST	POTENTIAL IMPACT ON PROJECT	NATURE OF DEPENDENCE AND POSSIBLE LINKAGES BETWEEN PRIMARY STAKEHOLDER AND OTHER STAKEHOLDER
PRIMARY	-	-	-
SECONDARY	-	-	-
EXTERNAL	-	-	-

Assess the influence and importance of stakeholder with a purpose to draw up implications for the project as whom to eliminate / play safe with / be careful / have coalition / participation / sponsorship etc.

IMPORTANCE

- Needs and Interests (if these are not met project cannot be deemed success)

INFLUENCE

- in terms of the extent to which SH's are able to persuade / coerce / influence in making decisions. It could be positive or negative influence on the project. (Influence may be due to Budget Holders / Authority of leadership / control of strategic resources / Knowledge / Authority of position / Negotiating position / Social, economic, political status etc.)

Key Stakeholder Matrix

		LOW	HIGH
I M P O R T A N C E	LOW		
	HIGH		

Summarize implications for each Box



Participation Matrix

What type of participation by the key stakeholders at what stage of the project to facilitate to achieve the project purposes may be determined by this matrix.

		<u>TYPE OF PARTICIPATION</u>			
		INFORM	CONSULT	PARTNERSHIP	CONTROL
I M P O R T A N C E	IDENTIFICATION				
	PLANNING				
	IMPLEMEN- TATION				
	MONITORING AND EVALUATION				

Position and Profession Conflict Management

determining how and when to critique and provide feedback.

1. focus on specific behaviours
2. keep it factual and impersonal
3. keep it goal oriented
4. make it well timed
5. ensure understanding
6. if negative, make sure it is suggestive and the behaviour is controllable by the recipients.
7. tailor the feedback to fit the person

Motivation Management

The biggest challenge any manager face in any organization is to motivate people to focus their mind and energies in doing a work as effectively as possible. It is basically the question of directing the mental and physical equipment of the individual towards work related performance. There is enough literature that suggests that people are motivated by i) meeting out their needs ii) setting clear and challenging goals iii) reinforcing quantity and quality of performance either positively or negatively, iv) creating relative equity in rewards for performance v) providing expected benefits and promotions. All the above mentioned factors in different combinations may be manipulated by a manager in different situations and organizations within the flexibility of the boundary of norms laid down for the organization. However, in the typical government set up many of the above factors may not find application for various reasons. Keeping this in view it is suggested that a process related approach may well be followed by a manager. The process here referred as what and how a manager interacts with his people. For instance the way (process) the manager exercises his leadership over his people would itself determine and affect the level of motivation. Similarly the exercise of the process of delegation, communication and coordination would definitely affect the level of motivation of employees. The other issues like decision-making, use of skills and authority etc., would contribute further to enhance motivation of individuals without costing money and committing great resources. In the following paragraphs an attempt is made to suggest strategies as how these four processes can be exercised by any manager to motivate his staff.

The limitation of this approach may be its high demand on the manager for his determined willingness, conviction, hard work, patience, commitment of time and efforts as it is manager centred and manager driven approach of motivation.

Exercising Leadership

The process of motivating people and guiding their behaviour in the organization is grossly dependent on the process of exercise of power and authority, which ideally should result in multiplication of power in the organization (empowerment of people). It is pertinent to mention here that power is the ability to influence whereas authority is the right to influence (by virtue of formal position).

One kind of authority, position authority, is linked to the position that a person holds in an organization. People hold different degrees of this authority according to their job and position in the hierarchy. This authority is delegated

by other people, generally people in positions of higher authority. Correspondingly, this authority can be withheld or withdrawn, and it has no value outside the organization, which supports it.

Another kind of authority, sapiential authority, which is acquired by virtue of ones knowledge and information. This also has a limitation as one person can't be specialist in all the areas of knowledge.

Third kind of authority is inherent in each one of us: process authority. It finds expression in our ability to offer relevant information, listen to others, question to clarify understanding, make proposals, offer skills and expertise, synthesize and build ideas, encourage and help others. Equally, it lies within our power to withhold such help. Such authority is not given to us for we already possess it; neither can it be taken away or denied. We face choices repeatedly: whether to try to help others and improve situation, remain silent and inactive, or seek to hinder and destroy. We can choose to co-operate to mutual benefit or manipulate to personal gain.

An ideal manager uses three of them in right proportion matching the situation, as a motivation strategy.

The general assumption followed by most managers, most of the time to manage people is to exercise positional authority, which mostly result in compliance and merely compliance would not ensure quality and standard. It is in this context where the manager has to act more like leader if he has to be a motivator. It is all the more important for managers who are involved in developmental activities where routine and mechanical use of authority is not going to produce results. It may be worthwhile to highlight a distinction between a routine manager and a manager as a leader.

Pattern Of Delegation

Delegation allows a subordinate to make decisions by transferring authority from one organizational level to another, lower one. It should not be confused with participation, where there is a sharing of authority when making decisions, which quite often managers do in organization. Delegation to my mind is not off loading and distribution of the work of manager, which is a usual practice in organization. It is a process through which manager (Boss) helps develop subordinate, improve decision, enhance subordinates commitment and improves relationship which ultimately results in empowerment of the organization and people. Therefore, a manager should understand that core objective of delegation is to empower people in terms of task (technical knowledge) and process

Sl.No.	Routine Managers	Manager as Leaders
1	Advocate stability and status quo	Agitate for change and new approaches
2	Impersonal, passive and functional attitude – goals arise out of necessity and reality	Personal, active attitude goals, arise from desire and imagination
3	Views work as a process to enable people and ideas combination. Seeks moderate risks	Looks for fresh approach to old problems Take high risks if pay off high.
4	Avoids solitary activity / close relationship / conflicts	Comfortable in solitary activity Intense relationship and not conflict averse.
5	Make a straight forward life adjustment accepts life as it is	Engage in struggle for a sense of order in life, questions life.

It is strongly advocated that the agricultural managers must conduct themselves more like leaders to motivate their people

(interpersonal relationships). In the present day developmental organization, the authority, responsibility and accountability is not enough to talk about but it should be the 'empowerment' as main end product even if it involves committing allowable and tolerable mistakes. In our organization most often we go by typical hierarchy to delegate work even if the person whom the work is delegated is not functionally competent as if delegation is to honour hierarchy and not of the work for which people exist in the organization. People exist in the organization because there is a function exists and if this is the logic how come a manager can afford to delegate a function to a less competent person over looking a person with greater competence. If this line of thinking is practiced, than and only then the 'empowerment of people' as a core objective of delegation and quality of function can be realized. Understanding of this concept on the part of the manager would bring a shift in delegation pattern of managers.

Managers must learn to trust others and create a supportive culture. Delegation if done with right intentions, increases a manager's effectiveness and still provide control about which managers are generally suspicious and wavering.

The following skills would help a manager for effective delegation: -

- (a) Clarify the assignment and determine what is to be delegated and to whom, the results you expect and any time or performance expectations you hold.
- (b) Specify the subordinates range of discretion
- (c) Allow the subordinate to participate in the task process before delegating.
- (d) Inform other stakeholders that delegation has occurred.
- (e) Establish appropriate feedback mechanism to check the work progress and ensure that authority guidelines are not being abused.
- (f) Do not encourage reverse delegation. The subordinate runs into a problem and then comes back to the manager for advice or a solution. Insist on recommendations from the subordinate when problems surface.

Co-Ordination Process

It is a mechanism that refers to the relationship among different departments or persons around a common objective or activity with a definite framework of sharing responsibility, roles and required resources and benefits accrued. Good coordination is one, which serves the needs of the client and user, and maintain balance for the needs of the other stakeholder.

It is worthwhile to mention here that routinisation and mechanization of procedure is functional in bureaucracy, but in a development programme like that of agriculture it is likely to inhibit progress. A set of rules and regulation, through programmed coordination, though useful to some extent can't solve all the problems.

It is noticed that effective coordination depends on the extent to which individuals in an organization understand the common goals and share in the belief that these are capable of realization if they make a conscious effort to articulate their activities. In order to ensure coordination a manager must I) integrate and unite the objectives of the parties / departments involved ii) provide an orderly arrangement of parties / departments efforts iii) have interest, understanding and skill generated to carryout activities together and iv) proportionately share the benefits / end product or outcome.

Summary

In the changing scenario the cultures, structures and processes in developmental organization cannot afford to be static and therefore dynamism in them would require a shift in behavioural and interactional patterns of the managers vis-à-vis members in organizations. Today's managers in these organizations need to be more sensitive and responsive to the internal as well as the external environment. A development manager may not be able to alter the structures as it is given to him, however he may bring about changes in the organization culture by introducing changed practices of various organizational processes. In view of this the organization processes like decision making, critiquing of ones own self and of other people and programs feedback mechanism, motivational patterns, exercise of leadership and coordination etc., need to be practiced differently in the constantly changing environment. Therefore, this paper is an attempt to provide an insight to managers to explore and understand some of these processes in order to manage people for organizational effectiveness.

References

- 1 Coverdale the practice of team work, London U.K., 1987
- 2 Leana, CR : Predictors and consequences of Delegation ; Academy of Management Journal December, 1986
- 3 P.C.Logframe R & D; Team Technologies, Inc. Virginia, USA
- 4 Stephen P.Robbins & Phillip L. Hunsakar : Pruntice Hall, Upper saddle River New Jersey, 1996.

TECHNOLOGY FRAMEWORK FOR COFFEE EXTENSION MANAGEMENT

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Coffee occupies a place of pride among plantation crops grown in India. Cultivation of this stimulating beverage crop is mainly confined to the Southern states of Karnataka, Kerala, Tamilnadu and Andhra Pradesh. Coffee is cultivated in an area of 3.05 lakh ha., by 1.4 lakh growers producing an average of 2 lakh tonnes annually. Coffee industry has a gross turnover of Rs.2000 crores, besides providing daily employment to 4 lakh people. This agro-forestry enterprise is second to none in its contribution to preservation of precious forest, rural development by providing employment to large number of growers, labours, traders and curers earning substantial foreign exchange to national exchequer.

Multifaceted problems faced by Coffee Industry in India are reflected in its low productivity at national level i.e., 860 kgs/ha. compared to potential yield of 1500 kgs/ha. Thus, there is a big gap between the potential and actual yield.

Twenty first century belongs to quality coffee. Quality assumes more importance considering the fact that 60 percent of the coffee produced in India is exported. Hence, maintaining the quality standards of domestic and international consumers is must for the survival of Coffee Industry.

At present, India's contribution to world coffee production is 2.5 – 3.5 percent which is insignificant to make impact in international market to play dominant role.

The ratio between the coffee growers to extension workers is very wide in India i.e., 450:1. The ratio further widens if only the gross root level extension workers are considered excluding the extension supervisors and administrators. The extension work is made more difficult due to large number of small growers in case of Kerala and tribal growers in the states of Andhra Pradesh and North Eastern states. Further Liaisoning with demographically scattered and geographically isolated coffee growers on heavy rainfall area complicated the extension further.

Thus, it is challenging task to coffee extension management not only to increase the yield and profit of farmers but also to produce quality coffee to meet domestic

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and international consumer demand.

It is practically impossible to teach everything on coffee to all the coffee growers. However, it is necessary to teach few things on coffee to few coffee growers. The technology framework decides what has to be taught to the farmers. The present paper is an attempt in this direction. The objectives of the study were,

1. To find out the knowledge and adoption level of coffee growers regarding recommended cultivation practices.
2. To examine the gaps in knowledge and adoption behaviour of coffee growers and in research system.
3. To identify the problems faced by coffee growers.

Methodology

The study was conducted in twenty randomly selected villages i.e., ten each in Chikamagalur district of Karnataka and Wynad district of Kerala during 1997-98. From each of the 20 selected villages, 10 coffee growers were selected using random sampling method. Thus, the total sample constituted 200 coffee growers from 20 villages.

A Knowledge Index and adoption scale was developed by using the standard procedures. The scale was tested for its reliability, validity and found sound. The scale consisted of 30 technologies consisted 99 recommended practices having total score of 100. The Knowledge Index and adoption scales were used to measure the knowledge and adoption levels of coffee growers in recommended practices respectively. Data were collected through personal interview method. The collected data were scored, tabulated and analyzed keeping in view of the objectives of the study. Other tools used for the study were

$$\begin{array}{lcl} \text{1. Adoption Gap Index} & = & \frac{\text{Maximum score with respect to the} \\ & & \text{technology recommended by Coffee} \\ & & \text{Board-Actual score obtained by Coffee} \\ & & \text{grower with respect to the technology}}{\text{Maximum score with respect to the} \\ & & \text{technology recommended by Coffee} \\ & & \text{Board.}} \times 100 \end{array}$$

		Maximum score with respect to the knowledge on technology recommended by Coffee Board – Actual scores obtained by Coffee growers with respect to the technology	
2. Knowledge Gap Index	=	-----	X 100
		Maximum score with respect to the knowledge on technology recommended by Coffee Board.	
		No. of problems perceived by coffee growers w.r.t. the technology – No. of problems for which the solution does exist.	
2. Research Gap Index in a particular technology	=	-----	X 100
		No. of problems perceived by coffee growers w.r.t the technology.	

Results

Knowledge of Coffee Growers

Table-I indicates that average knowledge level of the coffee grower was 59.51 percent. Almost equal number of coffee growers fell in low (31.5 percent), medium (35.5 percent) and high (33 percent) knowledge categories. Further analysis of the data revealed that poor knowledge in respect of vegetative propagation, soil conservation measures, drought management practices, nematode management and care and maintenance of machinery resulted in 31.5 percent growers possessing low knowledge.

Adoption level of Coffee growers

It is noticed from Table-II that average adoption level of the coffee grower was 51.7 percent. It is also found that only 27.5 percent of coffee growers belonged to high adoption category whereas 43 percent and 29.5 percent of the growers fell under medium and low adoption categories, respectively. Further analysis of data revealed that poor adoption in respect of seed coffee preparation, vegetative propagation, soil conservation practices, irrigation management practices, drought management practices, integrated weed management practices, soil testing, fertilizer application, plant protection practices, care and maintenance of machinery and labour management practices resulted in 29.5 percent of the growers coming under low adoption categories.

Knowledge gap and Adoption gap of Coffee growers

Table-III reveals that knowledge gap was more than 50 percent in 8 out of 30 relevant technologies. They are vegetative propagation, soil conservation measures, drought management practices, soil testing, Integrated Nutrient Management Practices, nematode management, integrated pest management, integrated disease management, care and maintenance of machinery, record maintenance and labour management.

Research Gap in Coffee

Table - IV, indicates that very high research gap was found in the area of farm management practices (81.81 percent), more than one third gap in soil, water and weed management practices (37.5 percent), around one forth research gap in nursery practices (22.22 percent), planting and after care practices (28.8 percent), plant protection practices (23.57 percent), harvesting and post-harvesting practices (25 percent), and low research gap was found in nutrient management practices (16.67). Overall, around 1/3rd (32.91 percent) of research gap was found in coffee.

Problems of Coffee Growers

It is evident from Table - V, that more than two-third of the growers perceived delayed and insufficient blossom and backing showers (67 percent) as most important problem. Other important problems are costly labour (30 percent), non-availability of labour (29 percent) and high market fluctuation (16 percent).

Discussion

- a. Average knowledge level of coffee growers was 59.55 percent and adoption level was 51.7 percent. Knowledge gap and adoption gap was more than 50 percent in eight and thirteen technologies respectively. The coffee research is being carried out from past 100 years and about 920 research papers are published. Coffee Board is exclusively working for this single crop. In spite of the availability of technologies, the knowledge and adoption level of farmers is low and gap is found. Hence, the areas where knowledge and adoption is low and knowledge gap and adoption gap is high which are discussed in results chapter may get priority in extension activities. Good liaison with other line departments and newspapers, Radio, TV and Agro-magazines is essential to attain this objective.

- b. Research priority may be given to areas where research gaps are wide. The research priority should reflect in the form of allocation of more budget, allotment of more scientific personnel and creating of more infrastructure. It is necessary to establish Farm Management department in Coffee Board.
- c. In determining the coffee yield, time and quantity of blossom and backing showers play important role. Even though coffee-growing tracts receive heavy rainfall throughout the year, suffer from want of adequate blossom and backing showers in right time. Therefore, it is necessary to educate the growers in harvesting the rainwater when it is plenty and recycle when it is needed. Thus, watershed should find importance in extension activities. Establishing demonstrations, organizing field visits of growers to watershed area and helping the growers financially with incentives will pay results in this direction. Introduction of crop insurance scheme in coffee has to be considered since coffee involves high investment and crop is exposed to the vagaries of nature.
- d. Labour is another important problem faced by majority of the growers. Different facet of this problem is costly labourer, non-availability of labour, high cost of transporting labour from far off places to working place, unskilled labour, harassment by labour unions and lack of technology transfer to labourers. Therefore, it is necessary to educate growers regarding proper supervision for managing the existing, limited labour efficiently and imparting skills to labourers to increase their efficiency. Thus, it is not only training owners, but training labourers is also important. Hence, extension programmes targeting labourers is also necessary. Mechanization in coffee cultivation will reduce the dependency on labour. Hence, it is necessary to start Agricultural Engineering Department in Coffee Research Stations. The labour should be educated to bring home the point that the survival of coffee estates is the survival of labourers.
- e. Fluctuating market is the off shot of liberalized trade, i.e., introduction of 100 percent free sale quota. Even though all coffee growers were initially benefited from the FSQ, later on, only traders, middleman and big growers took the advantage leaving the small growers to the mercy of uncertain market. Now, traders and middleman are organized and controlling the markets by dictating their own price. Hence, it is necessary to organize the growers into small co-operatives to take care of their marketing of produce. This will remove them from the clutches of big growers and

traders who otherwise exploit them. Coffee Board can play the role of reliable market information provider to the growers by establishing “updated market news service through recorded voice at telephone” at each liaison office. Then, traders and middlemen can not cheat the growers. Fluctuating market can also be stabilized by providing support price.

- f. Coffee growers and extension workers ratio in Coffee Board is wide i.e., 450:1. As such, it is difficult for extension workers to cover each and every grower and educate them in each and every aspect of coffee cultivation. It is further complicated by the demographically scattered and geographically isolated growers, vigorous monsoon, bad approach roads, bad electricity and telecom facility and inadequate funds and vehicles for the mobility of the extension worker. Making use of the findings of this study, it is possible to select needy growers and also possible to concentrate on few practices where the growers are weak in terms of adoption and knowledge. By use of group contact methods and mass media like TV, Radio and newspapers, periodicals, it is possible to reduce the burden on the extension workers.
- g. Extension goals, so far, are being stated in terms of number of growers contacted, meetings, dissemination of information, supply of seed material and other inputs including loans and subsidies. But, these are merely means, but not the ends in extension “*changing a person is more important than changing a practice*” may be the direction in which the extension should work.

Conclusion

In sum, the findings of the present study provides a technology framework for effective, coffee extension management considering the knowledge and adoption level of coffee growers, their knowledge, adoption gaps and research gaps. Technology framework is very useful in developing extension strategy under resources scare condition.

TABLE - I : Overall knowledge of coffee growers

(n=200)

Category	Coffee growers	
	No	%
Low (Below 51.7 scores)	63	31.5
Medium (51.7 to 67.44 scores)	71	35.5
High (Above 67.44 scores)	66	33.0
Total	200	100.0

Mean = 59.57

SD = 15.74

TABLE – II : Overall Adoption of recommended cultivation practices by coffee growers

(n=200)

Category	Coffee growers	
	No	Percentage
Low (Below 44.22 score)	59	29.5
Medium (44.22 to 59.18 score)	86	43.0
High (Above 59.18 score)	55	27.5
Total	200	100.0

Mean = 51.7

SD = 14.96

TABLE - III : Extent of knowledge gap and adoption gap among coffee growers

(n=200)

Sl. No.	Practices	Knowledge Gap in %	Adoption Gap in %
1.	Choice of varieties	4.00	1.50
2.	Seed coffee preparation	22.50	20.25
3.	Vegetative propagation	83.60	95.80
4.	Selection of suitable area	3.78	11.44
5.	Soil conservation methods	71.33	80.33
6.	Spacing	2.00	3.50
7.	Pitting	1.00	4.00
8.	Planting, staking, mulching & hutting	7.25	1.25
9.	Training, pruning and rejuvenation	22.57	21.14
10.	Choice of shade trees	40.00	36.00
11.	Shade regulation	32.00	9.50
12.	Cover digging	5.25	5.50
13.	Irrigation management practices	2.87	92.75
14.	Drought management practices	79.80	99.30
15.	Cradle pits	5.00	20.66
16.	Integrated weed management practices	50.00	54.90
17.	Soil testing	61.03	65.00
18.	Lime application	28.25	44.75
19.	Fertilizer application	37.00	31.33
20.	Integrated nutrient management practices	56.00	66.63
21.	Nematode management	90.50	96.00
22.	Integrated pest management	43.66	57.66
23.	Integrated disease management	50.50	53.00
24.	Harvesting	2.25	1.75
25.	Processing methods	8.25	14.88
26.	Weightage specification	35.00	33.00
27.	Care and maintenance of machinery	66.71	70.57
28.	Record maintenance	31.00	58.00
29.	Labour management	47.00	87.00
30.	Mixed farming	12.00	39.00

TABLE – IV: Overall research gap in coffee

Sl. No.	Areas	No.of problems identified by coffee growers	No.of problems for which, to solve technology not available or needs modifications	Research gap (%)
1	Nursery practices	18	4	22.22
2	Planting and aftercare practices	21	5	23.81
3	Soil, water and weed management	8	3	37.50
4	Nutrient management practices	6	1	16.67
5	Plant protection practices post-harvesting practices	7	2	28.57
6	Harvesting and practices	8	2	25.00
7	Farm Management	11	9	81.81
Overall		79	26	32.91

TABLE - V : Ten most important problems of coffee growers**(n=200)**

Sl. No.	Problems	Coffee growers	
		No	%

1.	Delayed and insufficient blossom and backing showers	134	67
2.	Labour is costly	60	30
3.	Non-availability of labour	58	29
4.	High market fluctuation	32	16
5.	Depends on business, coffee gets secondary importance	32	16
6.	Destruction of pepper due to wilt	28	14
7.	Lack of market information through reliable agency	24	12
8.	Middleman exploiting farmers	22	11
9.	Lack of timely visit of extension worker	22	11
10.	Lack of support price	18	9

LOCATION FOR FLOWER PROCESSING UNITS IN KARNATAKA : AN ECONOMETRIC ANALYSIS

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Jasmine is one of the oldest cultivated flower shrubs. It is estimated that at least 14500 kg., of cut flowers of different varieties of jasmine are sold everyday in the important cities of Madras, Bangalore, Bombay, Delhi and Calcutta. A large quantity of some species is also used for the extraction of essential oils.

Jasmine comprising of 20 genera and more than 200 species constitute a fascinating group of plants valued for their fragrance and for its concentrates. Jasmine species are either found growing wild in the nature or cultivated in the tropical and sub-tropical countries like India, China, Malaysia, Egypt, Algeria and Morocco. In India the plants found wild in northern Himalayan regions and in the regions of Western Ghats and Nilgiri hills of Tamil Nadu. The origin of this specie is believed to be in Asia.

In Karnataka, it is cultivated in an area of 1455 ha., with a production of about 6700 tones of flowers grown mainly in Mysore, Bangalore, Bellary and Dakshina Kannada districts.

Interestingly, off-late jasmine cultivation has received a great fillip after the potentialities of the south Indian jasmine were realized (especially for its extracts of essential oils). The serious limiting factor affecting the jasmine flower growers and consumers, which is likely to affect the commercial production is that the flowers are highly seasonal in nature and highly perishable. This nature of perishability affects the profit margin of the growers.

The least cost location of agricultural processing facilities within some specified geographical area has been the subject of a numerous studies. These studies have dealt with the assembling and processing of individual commodities or group of commodities for better pricing (marketing).

The main focus of the present study is to determine the number, size and location of the processing plants needed to minimize the combined cost of processing and transportation.

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- Jasmine being highly perishable, the center of production should normally be very near to the center of consumption
- Demand for flowers is not uniform and steady
- The presence of many intermediaries in the trading of flowers will affect the income of the flower cultivators ultimately

Thus the entire marketing and processing of flowers is confronted with various types of problems, which calls for an in-depth study to found out the economic aspects of the processing and marketing of flowers. Therefore this paper tries to gain an insight into the economic aspects of flower processing and marketing.

The main objective of the study is to simultaneously determine the number, size and location of plants that minimizes the combined transportation and processing costs involved in assembling and processing of any given quantity of raw material produced.

Methodology

In order to study the same, the Linear Programming (LP) technique (stollsteminer model) was used for the present study.

Potential plants sites in the region were assumed to be limited to the places where flowers were grown extensively, considering other factors like infrastructure facilities, availability of incentive, concession etc. However, the growing areas are divided into different regions based on agro-climatic conditions and quantity of raw materials.

Given the specific plant-cost relationship along with certain assumption that the plant cost function is invariant with respect to plant location. The minimum procedure is imposed on the problem using the transportation cost matrix.

The stollstemier's model used to minimize both the processing and transportation costs. The model can be algebraically stated as:

$$\text{Min. } TC = \sum_{j=1}^J P_j X_j L_k + \sum_{i=1}^I \sum_{j=1}^J X_{ij} C_{ij} L_k$$

Subject to:

J

$\sum_{j=1}^J X_{ij} = X_i$ (Quantity of raw material available at origin i per production period)

$j=1$

I

$\sum_{i=1}^I X_{ij} = X_j$ (Quantity of material processed at point j per production period)

$I=1$

$I \quad I$

$\sum_{i=1}^I \sum_{j=1}^J X_{ij} = X$ (Total quantity of raw material produced and processed)

$i=1 \quad j=1$

$X_{ij}, X_j > 0 \quad \& \quad C_{ij} > 0$

TC – Total processing and transportation cost

P_j - Unit processing costs in plant j located at L_j

X_{ij} - Quantity of raw material transported from origin i to plant j located at L_j

C_{ij} - Unit cost of transporting material from origin i to plant j located at L_j

L_k - One location pattern for j plants among the (L_j) possible combination of locations for J plants given L possible locations

L_j - A specific location for an individual plant ($J= 1...J$)

Assuming TPC is constant for any no. of plants

$J \quad I$

$TPC = P \sum_{j=1}^J \sum_{i=1}^I X_{ij} = P_x$

$j=1 \quad i=1$

P – Constant unit processing cost

P_x – Total quantity of material to be assembled and processed

TPC – Total processing cost

The optimum number of plants and their location can be determined directly by solving the above formulation. A plant will be located at each potential, site when the total cost determines the size of the plant with certain assumptions.

In order to solve the location model, data from 20 district of Karnataka State were analysed. These districts were aggregated to 5 regions. These regions are classified based on similar agro-climatic conditions as per below:

Region – I : Bider, Gulbarga, Raichur

Region - II : Bangalore, Bijapur, Bellary

Region - III : Mandya, Mysore, Bangalore, Chitradurga, Kolar, Tumkur

Region - IV : Dharwar, Chikkamagalore, Hassan

Region - V : Shimoga, Kodagu, Uttara Kannada

Based on the infrastructural facilities like area under flowers, power, water, transportation and productive work force etc., six locations were selected in Karnataka to set up the flower processing units. These units propose to be located at Bangalore rural, Mysore, Bellary, Shimoga, Dakshina Kannada and Bijapur. These districts fall under the 'developing areas' and get certain benefits, under the revised package of incentives and concessions for new industrial Investments in Karnataka 1993-1998.

These incentives and concessions include investment subsidy, incentives for installation of equipment for utilisation of renewable source of energy, sales tax concessions, and exemption from stamp duty and registration charges.

Optimal Plant Location

The total quantity of Champak, Jasmine and Tuberose flowers produce in the state of Karnataka during 1996-97 estimated at 21074 tones (Dept. Of Horticulture, Lalbagh, Bangalore). Out of this, it is assumed that about 40 percent of it (i.e. 8430 tone) are surplus available that could be utilized by the processing units as a raw material. In order to study the optimal location pattern of processing units, six potential areas were considered based on the consideration cited above. The proposed areas are Bangalore, Mysore, Shimoga, Bellary, Dakshina Kannada and Bijapur districts and the new industrial policy for Karnataka supports the selection of these areas. The optimal location patterns in the State of Karnataka ranging from one till six plants as specified in Table-1, shows plants of various capacities, total transportation costs (TTC), total processing costs (TPC) and optimum locations.

Findings

The result of the analysis revealed that, Mysore is the best suitable location, since the concentration of flower production is in and around the city. Therefore the location minimizes the transportation cost (Fig.1). Thus it was located in Mysore District, where both transport and processing costs together accounts to around Rs.215.03 lakhs per year (Table-1)

Further analysis shows that the combination of locations put together minimizes the transportation and processing costs (Fig.2). It could be seen that total cost is minimized with two units located at Mysore and Bangalore, which worked out to Rs.213.18 lakhs annually with daily processing of 14.05 tons per plant. The total cost increased marginally by Rs.213.24 lakhs per year, if the plants were to set up at Bangalore, Mysore and the third at Bellary. Each plant will have a daily processing capacity of 9.4 tones. However, by setting up plants at all the six potential lands sites proposed viz., Bangalore, Mysore, Bellary, Shimoga, Dakshina Kannada and Bijapur, the total cost works out to (Rs.252.82 lakhs/year) with the processing capacity of 4.60 tonnes. The transportation costs of the raw material to these six areas were worked out to Rs. 2.14 lakh/year, Though the multiple location of these plants minimizes the transportation costs with the simultaneous increase in the processing costs.

Since the optimum plant locations have been decided, as the second best and third best location configuration of plants have also to be considered along with the same. This would further aid in decision making which takes ground condition into consideration, which the model did not explicitly consider, if were to examine in terms of next best alternatives as the total cost increases (Table-1). After scanning the transport cost matrix through Linear Programming (LP) method, the output for different capacities with minimum transport cost was obtained.

Plant Location Model

Locating Processing plant is a crucial policy decision that has to consider various factors so as to enhance the competitiveness of a firm in the market economy. It has been the prime concern to economize the transportation cost. Other considerations such as regular supply of raw material, infrastructure facilities and incentives are crucial in determining the economic viability of location of such units. Large-scale production is imperative, so that the commodity can have a market presence. Small-scale production is often vulnerable to international fluctuations in demand and price. Hence future strategy should aim at large

output, so as to establish an international market presence for processed agro-product such as aromatic oils.

The details regarding the project cost and operating costs to be incurred for setting up a processing plant to extract essential oil from flowers are presented in Table-1. For setting up such plants there are many institutions, which provides financial assistance. For instance, Karnataka State Finance Corporation provides assistance upto 75 percent of the fixed capital towards building and machinery. Machineries include extractions, pre-concentrators, final concentrator boilers, cooling tower, support structure, hexane storage tank, steam piping, process piping with valved electrical motors and frame proof wiring etc. If the project costs exceeds Rs.20 lakhs then one should get working capital from some other sources like commercial banks. The rate of interest towards these loans is 19.5 percent per annum. Since profit margin is very high in this enterprise, high investment can be justified.

Processing is an important activity that enables the surplus flowers, which are perishable, has to be diverted to convert into essential oils, thereby eliminating the wastage of flowers. The Government of Karnataka new Industrial policies further justifies establishment of the processing units. According to this policy, one can get maximum concession and benefits. Investment subsidies are available up to 30 percent of the value of the fixed assets for the unit, which takes up expansion, diversification and modernization programmes anywhere in the state. The most profitable combination of processing units should be located where the combined cost of transportation and processing is least. At present two processing units are located at Mysore and Bangalore. Out of the total production of 21074 tones of tuberose, jasmine and Champak, it was assumed that 40 percent (i.e. 8430 tones) of the flowers produced are available as a raw material. An attempt has been made in the study to consider the establishment of more processing units at reasonably low costs in different areas of the state using LP model. If we consider the establishment of processing units at six different locations for the better coverage by the state viz., Bangalore, Mysore, Bijapur, Bellary, Shimoga and Dakshina Kannada, the gross TTC and gross TPC would be high. Where the TTC is very low, the TPC per plant is highest because the raw material has been supplied from the neighboring areas in order to operate the plant throughout the year.

The TTC+TPC would be minimum, if the two proposed plants are located at Bangalore and Mysore. The cost of establishment of the plants worked out to Rs.273.18 lakhs per plant for 4215 tons capacity annually. With a marginal

increase in the total cost, the additional two plants are proposed either at Bellary or at Shimoga, investment amounting to Rs.213 lacs per plant with 2810 tons capacity annually. This is because though the TTC is high, TPC per plant is very low because of the concentration of the flower production in these areas. Similarly because of these reasons, the TTC+TPC is very high for the plant of the lower capacities as presented in the Table 1 for regions 4,5, & 6. Therefore it is evident that the location of processing units in other areas of the state would depend to a large extent for increased quantity of flower in the coming years. The projection made for these flower crops have clearly indicated that there exists a scope to increase the quantity of flowers through increase in area and also by adopting modern technology.

Conclusion

Based on these findings, it may be inferred that direct marketing of flowers in a fresh form is comparatively less profitable to the processed form. Therefore processing facilities need to be created to encourage farmers to produce and supply the flowers to the processing plants, which will ensure the much higher and stable income. Karnataka State Financial Corporation (KSFC) while advancing the credit facilities to set up processing plants, must ensure that these plants should be established at Bangalore, Mysore, Shimoga, Bellary, Dakshina Kannada and Bijapur. Besides having better infrastructural facilities it has a comparative advantage with regard to transport and processing cost.

Table – 1 : Optimum Plant Location, Plant Size and Minimum assembling Costs in relation to Number of Plants**(Rs. in Lakh)**

Sl. No.	Capacity (tons/year)	Total Transportation Cost (Rs.)	Total Processing Cost (Rs.)	Total (TTC+TPC)	Location
1	8430	5.40	209.63	215.03	Mysore
2	4215	3.55	209.64	213.19	Mysore, Bangalore
3	2810	2.87	210.37	213.24	Mysore, Bangalore, Bellary
4	2107.5	2.42	214.85	217.27	Mysore, Bangalore, Bellary, Shimoga
5	1686	2.30	220.07	222.37	Mysore, Bangalore, Bellary, Shimoga, Dakshina Kannada
6	1405	2.14	250.68	252.82	Mysore, Bangalore, Bellary, Shimoga, Dakshina Kannada, Bijapur

References

- Byrket, D.L., Muller, R.A. and Taiganides, E.P., 1976, Modeling the Optimal Location of the Cattle Feeding Industry. American Journal of Agricultural Economics, 58 (2): 236-244
- Gupta, S.P. and Arora, V.P.S., 1988, Minimizing the Cost of Transportation for Soya bean Processing Industries in Uttar Pradesh. Indian Journal of Agricultural Economics, 43 (1): 56-62
- Kumbhare, S.L. and Sirohi, A.S., 1981, An Application of Linear Programming in Transportation and Storage of Wheat. Agriculture Situation in India. 35 (12): 919-923
- Lopez, R.A. and Henderson, N.R., 1989, The Determinants of Location Choices for Food Processing Plants. Agribusiness, 5 (2): 619-632
- Oppen, M.V. and Scott, J.T., 1976, A Spatial Equilibrium Model for Plant Location and Interregional Trade. American Journal of Agricultural Economics. 58 (3): 437-446

SMALL FARMERS AGRI-BUSINESS CONSORTIUM (SFAC) : A CASE OF MAHABOONNAGAR DISTRICT, ANDHRA PRADESH

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Agriculture forms an important sector of Indian Economy, But, the potentialities of development of this sector, for expanding employment opportunities, reducing and eliminating rural poverty accelerating agricultural production etc., post-harvest losses, lack of adequate marketing and processing facilities and absence of appropriate linkages between producers and consumers still remains to be exploited. In fact, the Eighth Plan had attached high priority to the objectives of employment and income generation in the rural areas. In this backdrop, the government envisaged the institution of the Small Farmers Agri-Business Consortium (SFAC). Which was announced by the Honorable Finance Minister in his budget speech in February 1992.

The planning commission, the executing body of the project, designated the M.S.Swaminathan Research Foundation as the implementing agency for the project with the mandate to organize 12 major projects in different parts of the country, based on a mix of enterprises with active participation by State Government, Financial institution and farm families.

The MSSRF selected Mahaboobnagar district in Andhra Pradesh and identified Andhra Pradesh Academy of Rural Development (APARD) for preparation of action plan for the district. The APARD accordingly prepared an initial proposal for the study, which was discussed by the State Level selecting Committee on February 24, 1994. Subsequently a multi disciplinary team was constituted and the action plan was prepared.

The SFAC meeting was held on 28.12.1998, authorized MD, SFAC to appoint a third party (Agriculture Finance Corporation) to review the 12 projects prepared by MSSRF and also convert the 12 project reports into bankable projects.

Objectives

The objectives of the project as identified by SFAC are

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1. Review of projects / schemes identified by MSSRF and to what extent these are bankable and having bearing on agriculture and economy of each district in the context of ninth five year plan.
2. Screen and identify each enterprise, which can be dovetailed with the district potential linked credit plans prepared by the NABARD, and IDBI for the 9th five year plan.
3. Identify such ventures that can give additional income and generate employment through commercialization of agriculture and providing support to agri-business allied activities in the district.
4. Appraise the technical feasibility and financial viability of the projects for the joint / equity participation by the financial institutions, SFAC and the group of farmers collectively and / or individually.
5. Identification of or suggestion for the structuring of a suitable organization for each of the project components, which would be acceptable to the banks operating in that district for financing the implementation of the project.

The study identified agriculture business enterprises in six areas. They are Horticulture, Sericulture, Seed Production for oilseeds crop, wasteland development, sheep production and rearing and diary farming.

I. Horticulture

To improve the economic conditions for the farmers in the district under the SFAC, four enterprises were proposed.

a. Nursery trade

Mango and custard apple

Mango Nursery - Kolhapur and Pedda Kottapalli mandals

Custard Apple Nursery - Jadchehrla and Balanagar mandals

b. Development of Orchards

Mango, custard apple and Guava

I. Mango - Kollapur, Amangal, Balanagar and Pedda Kottapalli mandals

II. Custard Apple - Balangar, Farooqnagar, Jadcherla, Amangal and Boothpur mandals

III. Guava - Farooqnagar, Amangal, Keshampet and Kothur mandals

c. Vegetable Production

Growing improved varieties of tomato and chilly to develop 25 hectares each under tomato and chillies in Kothur and Farooqnagar mandals, Establishing a processing unit.

d. Floriculture

Introduction of marigold and increasing area under crossandra and jasmine. The mandals identified are Kothur and Farooqnagar

II. Oilseeds - Castor Seed production

To increase the availability of castor seed by organizing castor seed production in the mandals or Damaragedda, Mangamoor, Makthal, Utkoor, Narayanapet and Dhanwada.

III. Waste Land Development

Gattu Mandal with 29% of the total geographical area coming under watershed has been selected for the SFAC action plan. It is proposed to develop 400 ha. in a group of 10 contiguous villages.

Horticulture - Development of Mango, Custard Apple, Ber and Sapota

Agro-forestry - Neem and Soap nuts

Diary farming - Fodder crops production and crossbred cows

IV. Sericulture

Development of sericulture in 9 villages of Nagar Kurnool, Telkapalli and Pedda Kothapalli mandals. The activities are mulberry plantation, cocoons productions, reeling and establishing twine charka units.

V. Sheep and Diary

For sheep development Makthal Mandal has been selected. This will be done through provision of support services like heath care, wool handling, and ram lamb fattening to increase meat export, strengthening sheep producer's cooperative organizations.

Dairy development will be organized in Shadnagar Mandal.

I. Horticulture

a. Nursery trade

- Mango - 6 ha in 4 years for 3000 ha. for 24 families benefit
Custard Apple - 5.2 ha. In 4 years for 416 ha. For 20 families benefit

b. Development of orchards

- Mango - 3000 ha
Custard apple - 416 ha
Guava - 500 ha

c. Vegetable production

25 ha each tomato and chilly every year (2 years total 100 ha)

d. Floriculture

- 5 ha. - Marigold
10 ha - Crossandra
5 ha - Jasmine

e. Training farmers for grafting techniques

f. Processing unit (Mango & Tomato) - Kothur or Farooqnagar 10 tons / shift/ day

II. Oilseeds Castor Seed Production

Jyothi - 30000 ha. Seed production to cover

Kranti - 7000 ha.

GCH - 4 10050 ha.

GCH - 5 3000 ha.

Seed village approach followed by OPP scheme

III. Waste Land Development

Development of horticulture crops - 200 ha.

Agro-forestry - 160 ha. 3 years phased manner

Fodder products - 40 ha.

Would cover about 1000 farm families

Selected villages for waste land development in Gattu Mandal

1. Yellammodooli - 163.0 ha.
2. Guntur - 85.0 ha.
3. Rajapuram - 55.0 ha.
4. Penchikal Padu - 81.0 ha.
5. Argidda - 32.0 ha.
6. Tapeta - 40.0 ha.
7. Gorlakhar dodi - 28.0 ha.
8. Macherla - 49.0 ha.
9. Balgam - 79.0 ha.
10. Mallempalli - 8.0 ha.

T O T A L	620.0 ha.
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The activities proposed under wasteland development

1. Land development and Water Conservation Measures
2. Horticulture
3. Agro Forestry
4. Fodder bank and Dairy farming

IV. Sericulture

- a. Mulberry cultivation
- b. Rearing of silk worms upto cocoons
- c. Reeling Cocoons into raw silks
- d. Silk twisting and weaving.

S.No.	Mandal	Village	Area Proposal	Families
1	Nagar Kurnool	Pedda madamor	8 ha.	20
		Vampalta	8 ha.	20
2	Taklapally	Cnandilal	4 ha.	10
	Pedda Kothapally	Sajeepa	4 ha.	10
		Jonnalaboiguda	16 ha.	10
		Mandinne	8 ha.	20
		Bacharan	4 ha.	10
		Sathapur	4 ha.	10
T O T A L			60 ha.	150

And also Training Farmers in the above said activities

V. Sheep Production

Makthal mandal - 17 villages – 700 units

Components are

1. Health care
2. Ram lamb
3. Wool handling
4. Selection and supply of breeding rams
5. Training

VI. Dairy Development

The SFAC report should follow the self-help group pattern of RASS to ensure better participation of women.

Shadnagar mandal - 100 units

200 women - two milch animals

Financial Outlay (Rs. lakhs)

Enterprises	No. units	Total outlay	Farmers contribution	Loan	Subsidy	Grant
Horticulture	407	68.00	6.80	41.00	20.20	-
Oilseeds	675	50.80	5.08	30.84	14.88	-
Sericulture	150	59.00	5.90	33.00	11.25	8.85
Waste land	1000	223.72	22.37	73.00	36.31	93.04
Sheep Devp.	700	81.10	8.11	35.44	17.45	20.10
Dairy	100	70.00	7.00	38.32	11.67	13.01
T O T A L	3040	552.62 (100.00)	55.26 (10.00)	251.6 (45.50)	111.76 (22.25)	134.00 (22.25)

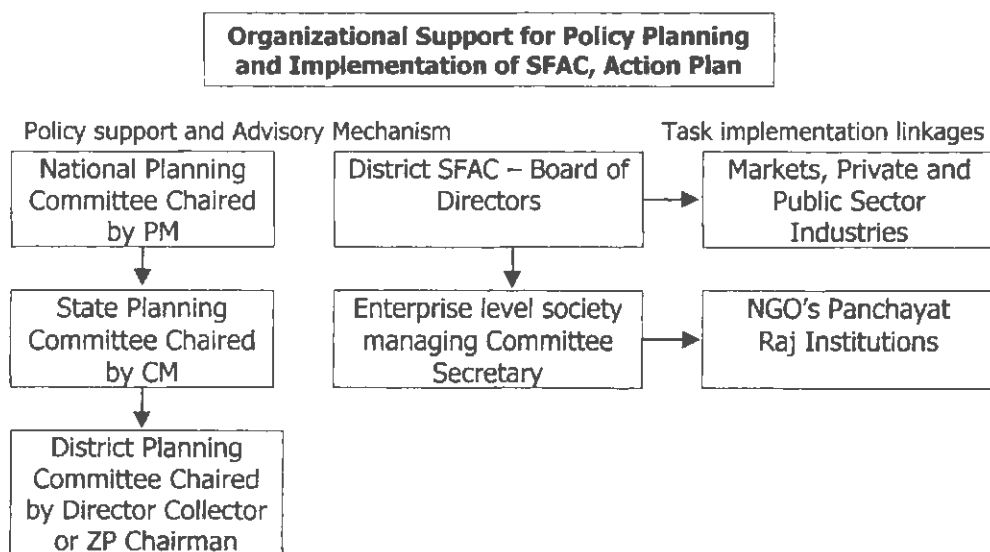
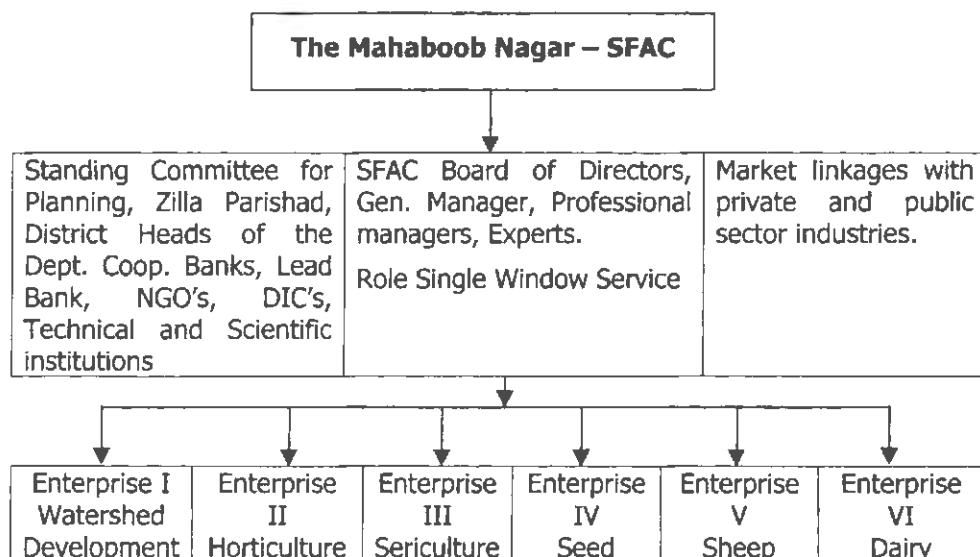
Source of Finance

Sl. No.	Item	No. of Units	Total outlay	Marginal money	Subsidy Refinance	Grant	NABARD
1.	Horticulture	407	68.00	6.80	20.20	-	41.00
2.	Castor Seed Production	675	50.80	5.08	14.88	-	30.84
3.	Sericulture	150	59.00	5.9	11.25	8.85	33.00
4.	Wasteland	1000	223.72	22.37	36.31	92.04	73.00
5.	Sheep	700	81.10	8.11	17.45	20.10	35.44
6.	Dairy	100	70.00	7.00	11.67	13.01	38.32
		3040	552.42	55.26	111.76	134.00	251.60

Organization Structure

To achieve the objectives of SFAC, appropriate organizational structure need to be identified at different levels of the production process to ensure production, infrastructural support and marketing.

The organization should ensure 'efficiency of corporate management as well as advantages of technology, investment, capital and market'.



Board of Directors

A three members Board of Directors constituted by the Corporation / Consortium will be responsible for the management of its programmes and activities in accordance with its objectives.

General Manager

The General Manager will be responsible to the Board of Directors and manage the operations of the corporations following the guidelines set up by the board. He will be responsible for administering its policies and projects. In this enterprise wise programme directors will advise him.

Training

The corporation will have arrangements with technical and Management Training institutions working at district and state level to impart training to the staff working with the corporation and the enterprise level society.

Enterprise Level Organization

Each cluster of villages identified for developing an enterprise will form a society registered under the A.P. Public societies Registration Act to run the enterprises with all the small farmers involved in it as members and one of them elected as chair person.

District Level Organizational Arrangements (Initial Years)

As suggested in the MSSRF impact, the organizational structure viz. A Joint Stock Company proposed above to function at the district level need not be set up immediately.

It would be left to the enterprise level societies to evolve a more suitable organization.

In the initial stages, the developmental infrastructure at the district level may be utilized instead of creating a separate organization for the purpose of implementing SFAC programme. A district level SFAC Committee may be constituted with the collector as Chairperson and the Heads of the District Development Departments including Agriculture, Animal Husbandry, Sericulture, Horticulture, Waste land development, (Rural Development), Forestry, Industries, Marketing and Irrigation. The Committee will also includes as members, representatives of NABARD, SBI / other lead banks, Coop. Banks, Agri-based industries, Zilla Parishad and NGO's operating in the District. The Committee

may also invite experts to its meeting for their advice on the management of identified enterprises.

The Committee may have staff consisting of one manager, who is a person with experience in banking / commercial organizations in day-to-day administration. He could be assisted in maintenance of records.

Marketing

For the District the enterprises suggested are Horticulture, Floriculture, Oilseeds, Sericulture, Sheep and Dairy Development, Marketing plays a very important role more so, in case of perishable crops like Mango, etc.

Horticulture and Floriculture

Fruits and vegetables being perishables present a host of problems for marketing. There is great risk involved in the collection of produce at a central place, its transportation to the consumers, grading, packaging and storage, etc. The starting of “**Rythu Bazaar**” by GOAP has opened up new issues in field of marketing. A number of Rythu Bazaars’ are functioning in Mahaboobnagar District of Andhra Pradesh.

Secondly under the project starting of food processing industry has been contemplated to solve the problem of marketing. Besides, it is suggested that a grower’s cooperative society could be organized with the objective of organizing whole gamut of activities ranging from collection, process, marketing of the produce to settling of accounts with farmers. The activities of Cooperative should also cover the marketing of flowers. The society may consider having their own transport for transfer of perishables like the fruits and cut flowers to the nearest city market.

Castor Seed Production

As there is lot of demand for quality seed of both varieties and hybrid, the marketing of castor seed may not be a major problem. Some of the seed producing agencies like APSSC and NSC are ready to buy back the certified seed from their registered growers. Even the farmers are ready to buy the seed from the neighbouring farmers if the quality is good. And also there is a permanent demand for castor hybrid seed in Mahaboobnagar District.

Sericulture

It is proposed to organize a Registered society of the Sericulture farmers to extend

support for input supply and marketing of the produce. Since the farmers are in experienced in running a cooperative society, it is suggested that a suitable NGO in the area be entrusted with this work so that the farmers do not feel the crunch in marketing of their produce. A regular tie up with the silk weaving industry in the area could also be organized in a systematic way.

Sheep

In order to develop the sheep trade a number of sheep societies and District Sheep Unions have been formed. These sheep societies at present are not handling the marketing of sheep, meat and wool. Even if they are doing it, the same is not to the desired extent. Therefore there is need to elevate the sheep societies to take up direct marketing of the produce of these members. The district Sheep Unions should establish close linkages with the village sheep societies and organize in marketing of the sheep and wool also.

Dairy

The Dairy Development work has to be handled by the women. In order to have better marketing of their produce, the women can form Self Help Group Schemes (SHGS) as is being done at Tirupathi under the aegis of RASS, NGO's working in that area.

Under SHG's, the women involved in the same activity are formed into groups for economy sake in raw materials purchase and marketing. These members pool their savings and their contribution for raising capital for collective purchase and organize marketing by themselves to avoid middlemen. This approach could be followed for Dairy Development under SFAC. The reasons cited for its successful operations are (i) Strong leadership, (ii) framing norms and adherence to them, (iii) cohesiveness and adjustment among members and (iv) proper accounting and management.

Schemes and Assistance

In Mahaboobnagar a number of schemes are operating at present for the various enterprises identified by the SFAC. The following schemes can be dovetailed with SFAC scheme, so that the participating farmers are benefited.

I. Horticulture

a. Introduction of hybrid improved vegetable seeds, seedlings/plant material.

The objective of the scheme is to increase the acreage under vegetables

and get higher economic returns per unit area under the scheme high quality seeds / seedlings are distributed to farmers at 50% subsidy. Under the scheme ceiling of one acre for each beneficiary has been fixed.

b. Central Sector Scheme on Integrated Development of Tropical and Arid zone Fruits (Rejuvenation)

This scheme aims at increasing the production productivity of Mango, Citrus, Guava and Sapota orchards, which are 15-20 years old. Under the scheme 100% subsidy on plant material and 50% subsidy on inputs.

The subsidy on inputs is limited to Rs.1,200/- for Guava and Sapota.

c. Integrated Development of Tropical and Arid Zone Fruits (State Sector Scheme (SSS))

The objective of the scheme is to step up the production and productivity of fruit crops by providing high yielding planting material and use of inputs.

d. Centrally Sponsored Scheme for use of plastics in Agriculture

The aim of the scheme is to economic use of water and to increase area under irrigation.

e. Centrally Sponsored Scheme for supply of Drip Irrigation Systems

The objective of the scheme is to bring area under irrigation by use of water saving devices like drip system. Under the scheme 90% subsidy is given to small and marginal farmers. This scheme is in operation since 1993-94.

f. Establishment of Nutritional Gardens (Central Sector Scheme)

The scheme aims at encouraging farmers to take up backyard cultivation of fruit crops to provide household nutrition security. Under the scheme distribution of free fruit plant material worth Rs.20,000/- in the district @Rs.25/- per farmer.

II. Castor Seed Production

a. Centrally Sponsored Oilseeds Production Programme

The objective of the scheme is to increase the production of Oilseeds. Under the project, seed production is the most important component. Under the OPP an integrated seed management is planned. Management of seed is the responsibility of the State Government in collaboration with the State

and Central Seed providing agencies. According to the guidelines issued by GOI, the State Government shall propose a five-year seed plan indicating requirements of breeder seed, foundation and certified seeds for each year and ensure their proper multiplication and distribution. The seed production programme is meant for all the oilseed crops including castor.

Under this programme, the state has planned to take up seed production and distribution of the two newly released castor varieties viz., Jyothi and Kiran. For Mahaboobnagar district the physical and financial targets for seed subsidy were 2500 qts. and Rs.5.7 lakh.

III. Waste Land Development

The Department of Rural Development Government of Andhra Pradesh, has identified 48.81 lakh hectares of wasteland and mapped using Remote Sensing Techniques in 19 districts of Andhra Pradesh. Out of this, 2.49 lakh hectares have been identified in Mahaboobnagar district constituting 13.54% of the total geographical area. The Department of Rural Development has planned and implemented a 10-year action plan for development of wasteland (1997-2007). About 3724.80 lakh allotted for developing 99 lakh ha., waste lands under DPAP, NWDPRA, DDP, IWDP, EAS, etc.

Under the DPAP Programme in Mahaboobnagar District Gattu Mandal has been covered.

IV. Sericulture

Mahaboobnagar District has sufficiently well developed infrastructure for sericulture created used NSP/DPAP/DRDA Programmes. There are 7 seed farms, 3 chowkie rearing units, 9 technical service centres besides one grainage and one reeling unit and two twisting units.

The Department of Sericulture has taken up several measures to develop sericulture in the district for purchase of seed cuttings and disease free laying. Subsidies were provided for making sheds and rearing houses. Under poverty alleviation programme the subsidy extended is 1/3rd of the unit cost to marginal farmers and 1/4th to small farmers. Programme is also implemented under National Sericulture Project (NSP). All these assistance have to effectively utilized for the small and marginal farmers being selected under the SFAC programme.

V. Sheep Farming

Andhra Pradesh ranks second in the country with 127.00 lakh sheep population

(1998). The density of sheep is highest in Mahaboobnagar district, indicating close relationship between drought and sheep rearing. The present sheep population in Mahaboobnagar district is about 25 lakh. The GOAP in this part has initiated 10 Intensive Sheep Development Projects with 7 sheep farms, yet the out reach of the services was inadequate. GOAP has initiated a number of measures for improving the lot of Shepherd Community.

The GOAP has sanctioned an Integrated Sheep Development Project in the year 1999. The project aims at increasing sheep societies / unions in the state for overall upliftment. The focus of activities in the project aim at training and enlightenment on modern and improved technologies and managerial practices including feed and fodder development, complete health care of their sheep and assisting them through supply of sheep units, Ram Lamb Units and Breeding Rams. The Project includes Training package, Health package and Distribution of assets.

The share of the Mahaboobnagar district for the above mentioned components of the project is as follows:

Sheep Rearing Physical and Financial Targets

Sl. No.	Component	Population	Targets	
			Physical	Financial (lakh)
1.	Pasture & Fodder development @ Rs.500/ha.		393 ha.	1965
2.	Sheep unit distribution		110 units	11000
3.	Breeding Ram Distribution		1965 units	39.30
4.	Ram Lamb Distribution		261 units	34.32
5.	Health Care		-	58.80
6.	Training		9050 units	9.05
7.	Marketing		-	-
T O T A L				154.435

It can be seen from the table that all the components proposed in SFAC Project are covered by the Integrated Sheep Development Project except that no funds have been provided for marketing of animals and wool. In view of this SFAC Project could be dovetailed and it can provide funds for marketing.

Conclusions

Horticulture

- i. No doubt, the establishment of nurseries for production of Mango and Custard Apple grafts in Mahaboobnagar district would help in timely availability of the plant material. But lack of adequate availability of water in the district for maintenance and production of nursery may create some problems in supply of quality grafts. It is therefore suggested that quality grafts could also be obtained from adjoining Rangareddy, Hyderabad and Kurnool districts. The cost of distributing grafts and production of the same locally would almost be the same.
- ii. Raising of custard apple orchards in the selected Mandals would be very profitable. Discussions with the Horticulture Department Officials indicated that the custard apple cultivation should be encouraged as an inter crop / border crop as raising it as a poor crop may not evoke the desired response from the farmers.
- iii. Under vegetable production increasing the production of Onions should also be included.
- iv. Under floriculture rose cultivation may also be included.
- v. The Mandals selected for the horticultural activities are suitable except that for nursery the mandals selected should be at the center of the district. The official's suggested Mahaboobnagar mandal and also presence of Agri-horticulture society can help in this activity.

Castor Seed Production

- i. Of late, a number of castor varieties and hybrids have been developed and released for general cultivation notable among them are Jyothi and Kiran varieties and GCH-4 and GCH-5 hybrid that are gaining ground over Aruna variety of castor. It is therefore suggested that more emphasis should be laid on production of certified seed of castor varieties Jyothi and Kiran followed by castor hybrid GCH-4 and GCH-5.

- ii. A well defined and well knit production programme for oilseeds has been drawn up and sanctioned under actually sponsored oilseeds production programme operating in the state. The castor seed production programme planned for implementation under SFAC should be dovetailed with OPP as the castor seed production programme under OPP would also be implemented in Mahaboobnagar district.
- iii. The selected mandals for the seed production activity are suitable and the activity can be taken in Rabi season only.

Waste Land Development

The Rural Development, GAOP has drawn a ten-year action plan (1997-2007) and implementing it from 1997 onwards. The 10 year action plan includes the development of total waste lands, degraded lands i.e., dry lands, which are being, cultivated under rainfed conditions and which require treatment of soil and moisture conservation as also the degraded forest.

- i. According to the Action Plan, the various departments, which are involved in the Development of such lands, are rural Development Department, Agriculture department, Tribal Welfare Department and Forest Department. Under the 10 years development plan, it is proposed to cover an area of about 100 lakh ha. in the entire state with an financial outlay of Rs.3758.80 lakh. It is therefore suggested that in the interest of effective implementation and higher economical returns, the SFAC programme for development of waste lands in Gattu Mandal of Mahaboobnagar district is linked up with the 10 years perspective development plan. The implementation of the programme could be entrusted to a NGO having experience in the field. Such NGO's are already available and are working in the district.
- ii. The implementation of SFAC programme and identification of a suitable NGO could be finalized in consultation with Rural Development Department of GOAP and COVOM.

Sericulture

- i. The farmers of Mahaboobnagar district generally do not come forward to take up mulberry plantations and rearing of silk worm because of the higher investment on the one hand and the problem of transporting the produce to Hyderabad market for sale on the other hand. To motivate the farmers to go in for sericulture, as a promotional activity it is suggested that the entire investment be given as a subsidy. The subsidy element should operate

for three years and alter in the next three years it should be tapered down to 10 percent, 5 percent and the nil.

- ii. The increase in mulberry plantation would result in larger and longer availability of silk worms, which will be much higher than the local demand of 500 odd silk weavers spread over the district. In order to overcome the problem of excess availability of silk worms, it is suggested that marketing and export of surplus produce be organized through registered service cooperatives/NGO's (experienced in the field of sericulture). The identified agency will organize suitable collection centres, transport to the concerned markets and offer remunerative farm gate prices to the farmers. As a promotional activity and stabilizing silk worm trade, these service cooperatives/ NGO's be given institutional finance so that they become self sufficient and organize their own business.
- iii. These service cooperatives / NGO's should also organize the marketing of the by products of the reeling industry like cocoons waste, reeling waste, etc.

Sheep and Dairy Development

- i. The Animal Husbandry Development, GOAP has sanctioned various schemes for sheep production among the schemes the most important one is the Integrated Sheep Development Project with a financial assistance of Rs.154.35 lakh for Mahaboobnagar district. The components proposed are similar to the SFAC activities and could be dovetailed.
- ii. The District Sheep Union and Village Level Unions should take active role in marketing of the sheep for better / remunerative price.
- iii. In all about 30 sheep cooperatives are operating in Mahaboobnagar District with a subscribed capital of Rs.17 lakh. These societies have to be strengthened and SFAC may provide funds for purchase of transport vehicles for better marketing. The society can charge a nominal amount from the farmers. They would be in a better position to negotiate for better prices.
- iv. The proposals for Dairy Development suggested in the SFAC report could follow the self help group pattern of RASS to ensure better participation of women. In the identified Shadnagar Mandal, VASORD (NGO) has already initiated this process.

AGRICULTURE DEVELOPMENT – FUTURE PRODUCTION AND PRODUCTION POSSIBILITIES IN ANDHRA PRADESH

*P. Kanaka Durga*¹*

Agriculture in Andhra Pradesh has witnessed many changes since 1950 in terms of land use, cropping pattern, input use and productivity. These changes are the outcome of many government policies with emphasis on:

1. Self-sufficiency in foodgrains production
2. Reduction of hunger among the poor
3. Availability of foodgrains to the consumers at reasonable prices
4. Price stability
5. Stable and adequate returns to farmers

Though these objectives have remained the same since 1950 the emphasis varied on each of these objectives and strategies followed to achieve objectives from time to time depending on the output levels, prices, and cost of production. The main strategy followed during 1950s was institutional changes². These changes augmented the agriculture output by extensive cultivation of land. With the possibility of bringing more land under the plough declining during the 1960s, the strategy shifted from extensive cultivation to intensive cultivation. The green revolution is thus can be conceived as the product of such an effort. To speed up the adoption of new agriculture technology the agriculture policy, which was in favour of the consumer before the advent of green revolution period, tilted in favour of producers by setting up of Agriculture Prices Commission, (presently Commission for Agriculture Costs and Prices (CACP)³), which recommends the Government on the minimum support prices (MSP) to be implemented⁴.

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2 *Zamindari was abolished and tenancy regulated.*

3 *These measures are intended to provide accessed avenue to the farmers in the dispersed villages of the country through regulated markets. The FCI procures foodgrains and maintains buffer stocks with a view to protect the farmer and the consumer from price risks.*

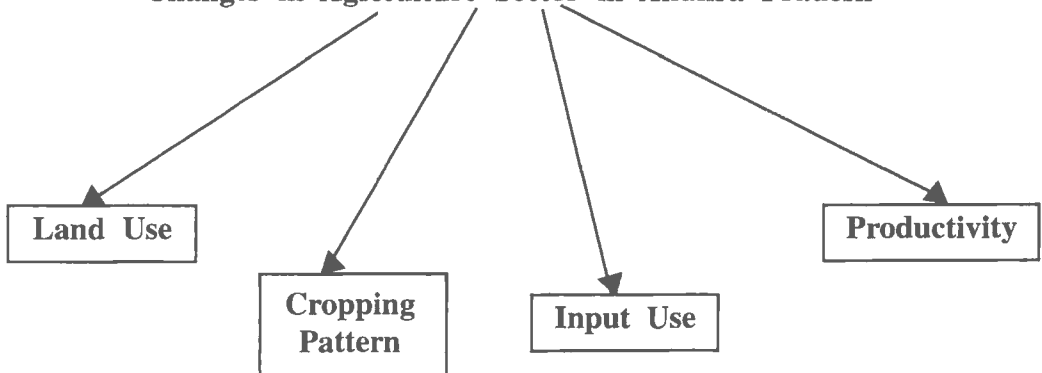
4 *The minimum support price policy was adopted to ensure that the farmers got a reasonable return by the Government undertaking to purchase the product at this price if the market price falls below it. This policy sought to encourage farmers to adopt new technologies and to provide them signals on the likely returns on the crops since the MSP took into account many factors like cost of cultivation, the likely levels of output and internal supply situation.*

A major initiative during the 1970s was nationalization of banks for increasing the access to cheap credit to the farmers. Subsidies on inputs, viz., irrigation, power for lifting water and chemical fertilizers were given to the farmers to encourage them to adopt the high cost green-revolution technology. Since 1980s the positive effects of green revolution has been started slowing down. It is often criticized that the agriculture revolution had favoured large farmers, areas and crops covered by irrigation to the neglect of dry lands. Paddy, sugarcane and other irrigated crops benefited at the cost of dry crops like millets, pulses and oil seeds. While poverty is declining in irrigated areas, poverty persisted at high levels and among all occupational groups in dry areas. These factors coupled with increasing environmental degradation resulted in a shift of focus on dry lands and rural development. The 1990s have brought about rethinking on the importance of earlier stated objectives and strategies due to the changes in the international trading regimes (WTO) which led to removal of restrictions on exports of agricultural commodities especially foodgrains like rice.

Keeping this background in view this paper analyses the future production and production possibilities of important crops in Andhra Pradesh such as rice, sugarcane, oil seeds, and fruits. Before making any pronouncements on the production possibilities of these crops it would be important to examine the changes that occurred in Andhra Pradesh in terms of land use, cropping pattern, input use and productivity. Towards this purpose this paper is divided into three sections. Section I covers the changes in agriculture sector since 1950, Section II gives the methodology adopted to forecast the production of rice, sugarcane, oil seeds and fruits and Section III presents the results.

Section I

Changes in Agriculture Sector in Andhra Pradesh



Land Use

The total geographical area of Andhra Pradesh is 27.5 million hectares. The land under forests, land put to non-agriculture use, barren and uncultivable land is generally considered as land not available for cultivation. This category of land was 10.25 million hectares (37 per cent of the geographical area) in 1950-51 and it increased to 10.81 million ha in 1997-98. The main increases were area under forests and land put to non-agriculture uses. The cultivable land⁵ was 3.1 million ha in 1950-51 (11 per cent) which declined to 1.8 million ha in 1997-98 (6.5 per cent). This decline was due to the decline in area under cultivable wastes, area under permanent pastures and other grazing lands. Fallow lands, which consist of current fallow and other fallow land was 3.69 million ha in 1950-51, which increased to 5.02 million ha in 1997-98. The net area sown in 1950-51 was 10.5 million ha (38 per cent of the total geographical area) which was declined in 1997-98 to 9.90 million ha (36.3 per cent). The decline in net sown area was also associated with an increase in fallow land. The gross cropped area in 1950-51 was 11.2 million ha and it increased to 13.4 million ha in 1997-98. The extent of land sown more than once increased from 0.91 million ha in 1950-51 to 2.58 million ha in 1997-98 (Tables 1 & 2).

TABLE - 1 : Land Utilization in Andhra Pradesh (Million Hectares)

Land Use	1950	1960	1970	1980	1990	1997
Forests	5.21	5.85	6.34	6.21	6.27	6.20
Barren Land	3.35	2.36	2.10	2.34	2.10	2.11
Land for non-agriculture use	1.69	1.83	2.12	2.17	2.31	2.50
Cultivable Waste	1.76	1.63	1.12	0.87	0.78	0.75
Fallow	3.69	3.35	2.65	3.91	3.86	5.02
Net Sown Area	10.50	10.8	11.7	10.7	11.0	9.90
Gross Cropped Area	11.20	11.8	13.4	12.3	13.2	13.4
Doubled Cropped Area	0.91	1.03	1.61	1.54	2.17	2.58
Total Geographical Area	27.4	27.5	27.4	27.4	27.4	27.4

Source: CMIE, various issues.

Land under permanent pastures, grazing, miscellaneous tree crops, groves and cultivable wastes are treated as cultivable but uncultivated land

TABLE - 2 Shares in Total Geographical Area (Percentage)

Year	Gross Cropped Area	Net Area Sown	Fallows	Cultivable Waste
1950	40.9	38.0	13.5	6.4
1960	43.1	39.5	12.3	6.0
1970	48.9	42.8	9.7	4.1
1980	44.7	39.2	14.3	3.2
1990	48.0	40.2	14.1	2.8
1997	48.9	36.3	18.0	2.7

Cropping Pattern

The growth in gross cropped area in the State was relatively poor compared to the national average. During 1997-98, the gross cropped area of the state was only 48.9 per cent and all-India average was 57.2 per cent (Table 2). Foodgrains accounted for about 70 per cent of the gross cropped area in the state up to 1980-81 and it declined to 50 per cent in 1997-98. Among the foodgrains rice occupy a pivotal position. The area under rice was increased from 2.2 million hectares in 1950-51 to 3.5 million hectares in 1997-98. It accounted for 19.7 per cent of gross cropped area which had gone up to 26 per cent during the same period. The area under this crop has recorded a positive growth till 1990. However, the late years of 1990 decade had witnessed a negative growth in area under rice (Tables 3 & 4).

Groundnut is the most prominent crop among oilseeds in Andhra Pradesh. It contributes more than 55 per cent in area under total oil seeds in the state. It accounted for 11 per cent of gross cropped area up to 1980 and increased to 18 per cent in 1990s. However, it could not retain this status for long and it fell down to 14 per cent in 1997-98. The area under other oil seeds viz., sesamum and castor was less than 5 per cent of the cropped area. The commercial crops like sugar and fruits contributed three and four per cent to gross cropped area in 1997 respectively. These two crops recorded significant positive growth rates and the rate of growth was much higher during 1980-81 to 1997-98 (Tables 3 & 4).

**TABLE – 3 : Harvested Area for Major Crops in Andhra Pradesh
(Million Hectares)**

Year	Rice	Groundnut	Oilseeds	Sugar	Fruits
1950	2.20	1.20	2.04	0.07	-
1960	2.96	0.80	1.42	0.09	0.35
1970	3.52	1.57	2.28	0.12	0.20
1980	3.60	1.30	1.86	0.17	0.23
1990	4.04	2.40	3.18	0.23	0.39
1997	3.50	1.83	2.70	0.37	0.53

**TABLE – 4 : Share of Harvested Area in Gross Cropped Area for
Major Crops in Andhra Pradesh (Per cent)**

Year	Rice	Groundnut	Oilseeds	Sugar	Fruits
1950	19.7	10.7	18.2	0.63	-
1960	25.0	6.8	12.0	0.76	2.96
1970	26.4	11.8	17.1	0.90	1.50
1980	29.3	10.6	15.2	1.38	1.87
1990	30.6	18.1	24.1	1.74	2.96
1997	26.1	13.7	20.1	2.68	3.95

Input Use

More than 60 per cent of the net sown area has no assured irrigation. The percentage of irrigated area to gross cropped area, which was 17.2 per cent, had increased to 37.5 per cent in the country as a whole. As against this in Andhra Pradesh, the irrigated area to gross cropped area has increased only from 23 per cent during 1950s to 38.5 per cent during 1997-98. The increase, therefore, is slow compared to the national average. Though a number of crops are grown in Andhra Pradesh only a few of them such as rice, sugarcane and groundnut are grown under irrigated conditions. These crops together accounted for 94 per cent of the irrigated area in 1950s, which fell down to 73 per cent in 1997-98. Among these, rice has a major share of more than 90 per cent in 1950s which has gradually fell down to 65 per cent (Table 6). The implication of this is that the increased irrigation facilities during the 1980s are used mainly for growing the crops other rice. This is due to the introduction of new yielding varieties in other crops also. The major sources of irrigation in the state are canals and tanks, which together contributed to 85 per cent of the irrigated area. The dominance of tanks however has disappeared after 1980s by giving its status to wells.

TABLE - 5 : Area Irrigated (Million Hectares)

Year	Net Area Irrigated	Gross Area Irrigated	% of Gross Area irrigated to Gross Cropped Area	Source Wise Irrigation (percent)		
				Canals	Tanks	Wells
1950	2.36	2.52	22.6	54.4	32.4	12.9
1960	2.91	3.47	29.4	45.8	39.6	11.3
1970	3.31	4.22	31.6	47.7	33.6	15.4
1980	3.46	4.34	35.4	48.9	26.0	22.4
1990	4.31	5.37	40.7	43.4	22.5	30.3
1997	3.95	5.16	38.5	39.9	14.3	42.5

TABLE – 6 : Crop-wise Shares of Irrigated Area in Total Irrigated Area (Percent)

Year	Rice	Groundnut	Sugarcane	Total Contribution by these Crops
1950	90.9	0.75	2.34	93.99
1960	89.1	1.58	2.51	93.19
1970	84.6	0.57	2.79	87.96
1980	77.8	0.48	3.94	82.22
1990	71.3	0.88	4.19	76.37
1997	65.4	0.70	6.51	72.61

Though fertilizer consumption in Andhra Pradesh is very low during the pre-green revolution period its use has been increasing drastically with the advent of green revolution. During 1970 to 1980 it has grown at the rate of 9 per cent per annum. However, it has slightly decreased during the second decade of green revolution (Table 7). The existing literature observed that there is an imbalance in the use of fertilizers in Andhra Pradesh where the optimal mix of N,P,K is 4:2:1.

TABLE – 7 : Growth Rates of Fertilizer Consumption (percent)

	1970 to 1980	1980 to 1995	1970 to 1995
Nitrogenous Fertilizer (N)	9.7	7.3	8.4
Phosphorus (P)	8.0	7.9	9.0
Potash (K)	8.6	5.4	8.0
N+P+K	9.1	7.3	8.5

(Hanumantha Rao et al, 1999)

Production and Productivity

Total foodgrain production recorded 3.6 per cent growth during the pre-green revolution period. However there was a slight fall in production growth during the post green revolution period mainly due to the fall in growth rate of area during this period. This fall is quite severe during post-green revolution period whose growth rate is less than the population growth rate. This is mainly due to the negative growth rates of pulses during this period. Among cereals rice is the major crop in A.P whose production is 8.5 million tones in 1997-98. Growth rate of rice though increased significantly from pre-green revolution period to post-green revolution period however it has fallen during the liberalization period mainly due to the fall in area under rice which is in turn due to the decline in irrigated area from canals and tanks.

Among oil seeds, groundnut dominated all other crops with a share of 88 per cent in total production in 1950-51 and 1.2 million tonnes of production. By 1980s and early 1990s its share had increased to more than 90 per cent. However, in 1994-95 as a result of increase in area under sunflower its share had fell down to roughly 85 per cent. Groundnut gained area from cereal crops during liberalization period as a result of the favourable policies of the Government. With regard to other oil seeds also, there was a reversal from negative growth rates in the liberalization period. As a result, the production of other oil seeds also has shown a substantial increase as compared to the pre and post green revolution periods.

Sugar cane is another important crop, which has witnessed a fall in the growth rates in the post-green period. This might be because of the relative importance of rice during the green revolution period as these are the competing crops. The liberalization period however witnessed an increase in area under sugar cane though the yield are continued to be negative (Table 8 & 9).

As far as productivity is concerned rice productivity was 2.47 tones per hectare. Compared to 0.92 tonnes in 1950. Yield of commercial crops like groundnut, other oil seeds and sugar increased at much slower rate when compare to rice (Table-9).

The growth in gross cropped area in the State is relatively poor compared to the national average. During 1996-97, the gross cropped area of the state was only 48.9 per cent. The percentage increase is only 3.6 per cent since 1956-57 when it was 45.3 per cent compared to this, the national average during 1956-57 was 45.4 per cent and it has gone upto 57.2 per cent by 1996-97. Similarly,

TABLE - 8 : Production (Million Tonnes)

Year	Rice	Groundnut	Oilseeds	Sugar	Fruits
1950	2.27	1.03	1.15	4.7	
1960	3.66	0.69	0.78	8.1	
1970	4.79	1.23	1.35	9.5	
1980	7.01	0.86	0.92	10.4	
1990	9.65	2.27	2.39	13.3	4.01
1997	8.51	1.16	1.21	13.5	5.47

the percentage of irrigated area to gross cropped area, which was 17.2 per cent, had increased to 37.5 per cent in the country as a whole. As against this in Andhra Pradesh, the irrigated area to gross cropped area has increased only from 27.2 per cent in 1956-57 to 43.1 per cent by 1996-97. The increase, therefore,

TABLE - 9 : Productivity (Ton/Hectare)

Year	Rice	Groundnut	Oilseeds	Sugar	Fruits
1950	0.92	0.77	1.10	6.06	
1960	1.24	0.87	1.23	8.89	
1970	1.36	0.79	1.20	7.92	
1980	1.99	0.66	0.93	7.86	
1990	2.44	0.95	1.40	7.28	12.8
1997	2.47	0.65	0.99	7.30	14.0

TABLE – 10 : Contribution of Area Growth and Yield Growth to

Production Growth (percent)	Rice	Sugarcane	Groundnut
Area Share			
1949-1968	45.2	74.8	16.9
1968-1980	39.4	36.9	-
1980-1995	-1.0	118.0	72.0
Yield Share			
1949-1968	54.8	25.2	83.1
1968-1980	60.6	63.1	
1980-1995	101.0	-18.0	28.0

is slow compared to the national average. Cropping intensity in the state is hardly 138 per cent and below national average.

As far as production is concerned, the state stands 2nd in groundnut, 3rd in rice and sunflower, 4th in case of cotton, jowar, maize and oilseeds. In case of pulses and sugarcane, it stands 5th. When it comes to productivity, its ranks 2nd in case of maize with 2857 Kgs. per ha despite being rice bowl of South India, the productivity level of rice is only 2494 Kgs. per hectare which is far below Punjab, Tamil Nadu and Haryana. In case of cotton and sugarcane, the productivity rank is only 4th in the country. Despite second in production, the productivity of groundnut is below national average of 1155 Kgs. per hectare and the State ranks 6th in productivity. The pulses' productivity of the state is much below national average with 477 Kgs. per hectare against 623 Kgs., per hectare of the country. In case of oilseeds as a whole, once again the State productivity is below national average and stands at 810 Kgs per hectare (10th rank) against 931 Kgs. national average. It is surprising to note the low productivity levels despite high consumption of fertilizers per hectare in the State. It is only second in consumption of fertilizers at 128.9 Kgs. per hectare in terms of NPK. During 1994-95 it consumed 16.44 lakh tonnes of NPK next only to Uttar Pradesh.

Section - II

Methodology for Supply Projections for 2010

The estimation of supply projection for 2010 is carried out for rice, groundnut, total oil seeds, sugar cane and fruits using the data on various variables for the period 1950-51 to 1997-98. The procedure followed for estimation of supply projections is as follows:

$$P = A * Y \text{ ————— } 1$$

Where

P = Production
A = Gross Cropped Area
Y = Yield per acre

- I. Projected gross cropped area by adding the net area sown and the area sown more than once
- II. The net sown area is projected using the exponential growth rates of net sown area for the period 1987-88 to 1997-98.
- III. Area sown more than once was projected on the basis of relationship between the irrigated area and the area sown more than once for the period 1950-51 to 1997-98 and the planned irrigation programme in future. Cropping intensity is projected based on the estimated relationship between cropping intensity and area irrigated. Using the impact variable which is derived by estimating the above relationship and future irrigation potential available in the state economy the cropping intensity is projected.

$$CI = a + b I^t + ut$$

Where	CI	=	Cropping Intensity
	I	=	Irrigated Area
	U	=	Random Error Term
	a, b	=	Parameters to be estimated
	t	=	Time

Yield per hectare is projected based on the following formulae:

$$Y^* = \left[\sum_{t=1}^m (Y_t - Y_{t-1}) / Y_{t-1} \right] / m$$

$$Y^* = \left[\sum_{j=1}^n (Y_{t-1} - Y_t) / Y_{t-1} \right] / n$$

Where,

Y^* = growth rate of the yield

Y_t = Yield of the respective crop in the t^{th} period

Y_{t-1} = Yield of the respective crop in the $t-1$ th period

$Y_t > Y_{t-1}$ in equation 1

$Y_{t-1} > Y_t$ in equation 2

m is years of positive increments in yield in the t^{th} period from $t-1$ period.

n is years of decrease in yield in the t^{th} period from $t-1$ period.

Data Sources

Secondary data has been collected from various sources such as Economic Survey of India, Season and Crop Reports of Andhra Pradesh, Statistical Abstract of Andhra Pradesh, and Bulletin on Food Statistics.

Section - III

Results

1. Net sown area is projected using the historical growth rates for the period 1950-51 to 1997-98. It is declined from 9.90 million hectares in 1997-98 to 9.65 million hectares in 2010. If the fallow and other cultivable waste lands are brought under cultivation NSA would be increased to more than 10 million hectares in 2010.
2. Though the cropping intensity has increased from two million hectares to more than three million hectares gross cropped area registered a fall from 13.4 million hectares to 13.3 million hectares.

3. Area under each crop is projected based on the growth rates of share of area in total gross cropped area by each individual crop. Area under all crops has increased with rice retaining its original position whose share is found to be increased from 26 per cent to 44 per cent. Area under groundnut has shown tremendous improvement in the projected period that increased from 13.7 per cent to 29 per cent. Sugar cane area share has more than doubled from 2.68 per cent to 5.40 percent. Area under fruits is also more than doubled from 3.95 per cent to 8.05 per cent.
4. However there is slight improvements in yields of these crops (Table 11).

TABLE – 11 : Projected Variables

Variable	1997	2010
Net Sown Area (NSA) (Million Ha)	9.90	9.654*
Cropping Intensity	2.58	3.62
Gross Cropped Area (GCA)(Million Ha)	13.4	13.279
Share of rice area to GCA (%)	26.1	44.24
Share of ground nut area to GCA (%)	13.7	29.91
Share of oil seeds to GCA (%)	20.1	33.70
Share of Sugar cane area to GCA (%)	2.68	5.39
Share of Area under fruits to GCA (%)	3.95	8.05
Yield of Rice (ton/ha.)	2.47	2.67
Yield of Groundnut (ton/ha.)	0.65	0.69
Yield of Oilseeds (ton/ha.)	0.99	1.03
Yield of Sugarcane (ton/ha.)	7.30	7.39
Yield of Fruits (ton/ha.)	14.0	14.86

Note: * Based on the exponential growth rate of NSA -0.22 per cent from 1987-88 to 1997-98

TABLE – 12 : Crop-Wise Projections of Supply by 2010 in Andhra Pradesh
(Million Tonnes)

Crop	1980	1990	1996	2010
Rice	7.01	9.65	10.68	15.69
Groundnut	0.86	2.27	2.05	2.73
Oilseeds	0.92	2.39	2.15	2.94
Sugarcane	1.04	1.33	1.48	2.65
Fruits		4.01	5.47	9.12

1. In the projected period production of rice has increased from 10.7 million tonnes to 15.7 million tonnes that is an increase of 40 per cent in fifteen years. Groundnut would increase by 33 per cent, oil seeds by 37 per cent. The maximum increase is found to be in sugarcane and fruits, which witnessed 79 and 67 per cent respectively (Table 12).
2. Though the future production in absolute terms is found out to be increasing the possibilities of increasing agriculture production is slowing down with closing down of land frontier for further cultivation and stagnating/declining growth rates of yields. Until the early 1970s yields were low and inputs used were minimal. Thanks to the advent of green revolution the use of high yielding varieties, fertilizers and pesticides had gone up. As a result yields improved tremendously in respect of those crops which came under the influence of green revolution. The 1970s and 1990s witnessed rapid commercialization of agriculture particularly sugarcane, groundnut and cotton as these crops gained area against the coarse cereals. As a result foodgrain production growth rates have declined. The benefits of green revolution reached a plateau. The affluent farmers ploughed back the profits generated by green revolution not in agriculture sector but as investment in hotels, cinema, and shares which resulted in decline in investments in agriculture and a slow down of production. This can be stopped by some extent
1. With an effective implementation of land reforms in the area of conferment of ownership rights on tenants as the possession of land provides a sense of psychological, social, and economic security.

2. Fallow lands are increasing largely in areas dependent on dry land agriculture. There is a need to introduce and integrate technologies suitable to tune the existing socio-economic realities for success of dry land agriculture. Efforts must be increased to disseminate the available dry land technologies.
3. The decline in real investment in irrigation should be checked up. Explore the possibilities for cost-effective expansion of irrigated area. Scaling down the subsidies provided for water, electricity and fertilizers.
4. Correct the imbalance in the use of plant nutrients.
5. Efficient dissemination of information and training in the use of modern technologies is the need of an hour. For this, an appropriate extension service both top down and bottom up forms of information between farmers, extension workers and research scientists to promote and adopt the location specific farm technology.

TECHNOLOGICAL NEEDS OF WOMEN IN PADDY CULTIVATION : A STUDY IN RANGAREDDY DISTRICT, ANDHRA PRDESH

K. Uma Rani*

Women were perhaps the first to domesticate the crop plants, and have played a pivotal role in the development of agriculture. In Indian mythology, women are rightly worshipped as Annapurna - the provider of food. Even today, the rural women continue to play an important role in farm related operations, besides fulfilling other responsibilities of home making and child rearing. The female population in the country according to Census 1991, is 406.38 million (48.15 per cent of total population) of which 75 per cent are rural. The percentage of women cultivators is 34.22, women agricultural labourers is 44.93; in livestock, forestry, fisheries and other allied activities 1.60 per cent of women are involved (Gangadhara, 1995).

To boost up the agricultural production, the need for enhancing the technical knowledge of women has been felt since long but not much attention was paid in this direction till the launching of the centrally, sponsored and carefully conceived schemes of "Farmers Training and Education Programme" at the beginning of the Fourth Five Year Plan. Since then growing attention was being paid to technological needs of women in agriculture. If proper education and training are given to them, their potentiality and talent could bring a desirable change in our national development (Madivanane, 1990).

For undertaking any training activities effectively the extension functionaries working in the area should have knowledge about the specific technological needs of the farmers of the area. Keeping this in view the study was undertaken with the following objectives :

1. To assess the extent of technological needs of women in paddy cultivation.
2. To find out the relationship between personal and socio-economic characteristic with the technological needs of women in paddy cultivation.

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Methodology

The study was conducted in Ranga Reddy district of Andhra Pradesh. In consultation with the local extension functionaries and the officials of department of agriculture three Mandals were selected at random in which paddy was grown as major crop. From each of the selected Mandal, two villages were selected randomly. Since the purpose of the study was to assess the technological needs of women the woman member of the household who was actively involved in farm operations was selected as respondent. From each village twenty women were selected randomly thus making total sample 120. The data were collected using a structured interview schedule and analyzed using percentages, ranking of mean scores and simple correlation coefficient techniques.

Results and Discussions

The extent of technological needs of women in different subject matter areas of paddy cultivation are presented in Table - I

TABLE - I : Extent of Technological needs of Women in Paddy Cultivation (N=120)

S. No.	Subject matter areas	Much needed(%)	Somewhat needed(%)	Not needed(%)
1	Land preparation and manuring	29.2	16.7	54.1
2.	Selection of variety	52.5	10.0	54.5
3.	Seed rate	47.5	15.0	37.5
4.	Seed treatment	54.2	10.0	35.5
5.	Nursery bed preparation	21.7	7.5	70.8
6.	Transplantation	45.9	13.3	40.8
7.	Fertilizer Application	38.2	10.0	50.8
8.	Weed Control by Weedicides	58.3	14.2	27.5
9.	Plant Protection measures	50.0	13.3	36.7
10.	Soil and moisture conservation	35.8	14.2	50.8
11.	Harvesting and post-harvesting	45.0	14.2	40.8
12.	Compost making	22.5	12.5	65.0
13.	Storage of food grains	42.5	15.0	42.5
14.	Irrigation	12.9	2.5	84.6

* *Multiple responses*

Available empirical evidence contained in the table revealed that 54.1 percent in case of land preparation and manuring, 70.8 percent in case of Nursery bed preparation and 65 percent in case of compost making the involvement of women was not needed in paddy cultivation. However, in selection of variety (52.5 percent), seed treatment (54.2 percent), weed control by weedicides (58.3) percent) and plant protection measures (50.0 percent) were found to be the much needed technologies by the sample respondents in paddy cultivation.

Table - II : gives the rank order of the technological needs of women in paddy cultivation.

**TABLE - II : Rank Order of the Technological Needs of
Women in Paddy Cultivation**

(N=120)

S. No.	Subject matter areas	Mean Score	Rank Order
1	Weed control by weedicides	2.308	I
2.	Seed treatment	2.183	II
3.	Selection of variety	2.150	III
4.	Plant Protection measures	2.133	IV
5.	Seed rate	2.100	V
6.	Transplanting	2.092	VI
7.	Harvesting and Post-harvesting	2.042	VII
8.	Storage of food grains	2.000	VIII
9.	Fertilizer application	1.925	IX
10.	Soil and moisture conservation	1.858	X
11.	Land preparation and manuring	1.750	XI
12.	Compost making	1.575	XII
13.	Nursery bed preparation	1.508	XIII
14.	Irrigation	1.342	XIV

Average mean score = 1.926

The average mean score of the 14 subject matter areas is 1.926. It may be observed from the table that out of 14 subject matter areas the first eight were found to be the most important areas of technologies. The remaining six areas were considered as less important. This might be due to the fact that women participate more in these activities and not aware of technologies properly. These

results are in conformity with the results obtained Bhuyan and Tripathi (1998), Ponnuswamy et al (1990) and Subhasini (1990).

Table - III : gives the correlation between the personal and socio-economic factors and technological needs of the women in paddy cultivation.

TABLE - III : Correlation Between the Personal and Socio-economic Factors and Technological needs of Women in Paddy Cultivation
(N=120)

S.No.	Variables	'r' - Values
1.	Age	.2723*
2.	Caste	.1378
3.	Education	.0534
4.	Type of Family	.2188*
5.	Size of the Family	-.0593
6.	Category of the respondent	-.497
7.	Ownership of Land	-.0715
8.	Family Income	.0344
9.	Farm Experience	-.1996*
10.	Participation in Agriculture	.1602
11.	Participation in Horticulture	.2903*
12.	Participation in Animal Husbandry	.0450

* Significant at .05 level

** Significant at 01.level.

It can be seen from Table III that out of 12 variables, age, type of family farm experience and participation in horticulture were found positive and statistically significant with the technological needs of respondents in agriculture. The table further revealed that, while type of family and participation in horticulture had a positively significant relationship at 0.05 percent. Level of probability, farm experience had a negative significant relationship (at 0.05 percent level). After obtaining higher level of farm experience the farm-women would have acquired self confidence and it might have curbed their desire for mere knowledge. This could be the reason that can be assigned for negatively significant relationship of farm experience with the technological needs of women. This finding is in agreement with the findings of Madivanane (1990)

Conclusions

The study has brought out specific technological needs of women in paddy cultivation namely : selection of variety, seed rate, seed treatment, weed control by weedicides, plant protection measures, transplanting, post-harvest and storage of grains. Proper training and education has to be organized to impart knowledge and skill in the identified areas of technologies related to paddy cultivation. This will enable the women to play their role in agriculture more effectively and contribute their best for the well being of their family.

References

- Bhuyan, B. and Tripathy, S.K. (1998). "Role of Women in Agriculture" -A study in Ganjam District of Orissa, Journal of Rural Development, Vol.7(4) pp.445-452.*
- Gangadharan, N. (1995). "Women in Farming and Improving Quality of Life in Rural Areas", Asian productivity Organisation, Tokyo, PP. 262-263.*
- Madivanane, S. (1990). "A Study on Training Needs of Farm Women in Karaikal Region of Pondicherry", M.Sc.(Agri.) Thesis, Tamil Nadu Agricultural University, Coimbatore, PP. 2, 5-9, 23.*
- Ponnuswamy, K.A. Ravichandra, V., Soma Sundaram and Perumal, G.(1990). "Training Needs of Farm Women in Agriculture and Allied Fields", Tamil Nadu Journal of Extension Education, Vol.1, July-December, No.3&4, PP. 140-143.*
- Subhasini, R. (1990), "role of Farm Women in Hill vegetable farming", M.Sc. (Ag. Extension) Thesis, Tamil Nadu Agricultural University, Coimbatore, PP. 126-137.*

AN ECONOMETRIC ANALYSIS OF FACTORS INFLUENCING MILK PRODUCTION AND SUPPLY RESPONSE OF MILK TO CHANGE IN PRICE AT THE PRODUCER'S LEVEL: A STUDY IN RANGA REDDY DISTRICT, ANDHRA PRADESH

*J.P.Singh**

Over the last few decades, milk production in India has¹ undergone a sea change from the rock bottom level of about 17 million tones in 1950-51 to more than 50 million tones in 1989-90 and 66.1 million tones in 1995-96. It has been estimated that the milk production would reach at the level of 100 million tones by 2001¹. The credit for such achievement is attributable to the efforts of the planners and policy makers who conceived of the National Dairy Development Board to replicate the experience of success of Kaira Milk Co-operative Society, popularly known as AMUL, on the one hand and the Indian farmers, who showed tremendous interests in cattle improvement through crossbred programme on the other. In rural India, despite sustained efforts of cattle improvement, low yielding non-descriptive cows and buffaloes outnumber the crossbreeds. Though vast majority of the farmers rear such non-descriptive and low yielding milch cows on sentimental grounds without any economic content fairly large number of farmers depend upon dairy units to supplement household income. Livestock is not only viewed from the angle of source of milk but also viewed from the angle of cheap source of manure and transport for farming and a source of employment for the households in the rural area.

The advent of "Operation Flood" has made the farmers in rural areas to realize the importance of dairy units as the potential source of additional income and employment. But the facts remain in the uneven distribution of gains from livestock enterprise across the country.

In Andhra Pradesh, the dairy sector is rapidly growing and it is the seventh largest milk-producing state in India. In 1995, milk production constituted 11 percent of Andhra Pradesh's agricultural economy (at current prices) and the sector was one of the biggest contributors after rice. The Andhra Pradesh Dairy Development Co-operative Federation (APDDCF) has through its own Operation

¹ Goel, A.K. *Indian Agriculture from independence to 21st Century*, Manage Publication.

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Flood become a major force in developing milk production, organizing its marketing and establishing milk producer's co-operatives.

Developing the sector will thus not only create economic growth in Andhra Pradesh, it will also help reduce rural poverty and empower women.

By 2020, Andhra Pradesh is expected to be among the top three producers of milk and milk products in India. Milk production alone will account for 12-15 percent of its agricultural GSDP². To achieve this vision, Govt. of Andhra Pradesh has launched a comprehensive programme to develop the dairy sector.

In this backdrop, an attempt has been in this study to identify² the factors that influence milk production and to derive the short-run supply functions of milk for cows and buffaloes in the sample villages of Manchal Mandal of Rangareddy District, Andhra Pradesh, with the following objectives.

- a) to study the economics of production of cow and buffalo milk.
- b) to ascertain the factors that influence milk production, and
- c) to derive the short-run supply function of milk for cows and buffaloes in the area under study.

Methodology

The primary data collected for the present study correspond to randomly selected, one Mandal (Manchal of Rangareddy District, A.P), two villages (Bandelmur and Chennareddyguda) and 60 farmers. All the farmers were classified into three categories i.e., marginal farmers (with operational holding less than one hectare) small farmers (with operational holding 1 to 2 hectares) and large farmers (with operational holding of above 2 hectares). Thus there were 27 marginal farmers, 19 small farmers and 14 large farmers.

The data used in the analysis relate to 1998-99 The Cobb-Douglas production function of the following form was used to estimate the parameters.

$$y = a_0 X_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4}$$

2. Vision 2020, Swarna Andhra Pradesh, Govt. of Andhra Pradesh, 1999.

where,

- y = Quantity of milk production in litres per year
 X_1 = Value of green fodder fed to milch animals in a year
 X_2 = Value of dry fodder fed to milch animals in a year
 X_3 = Value of concentrates fed to milch animals in a year
 a_0 = intercept term

Ordinary least square method was used to estimate the regression coefficients. Zero order correlation matrices were worked out to examine the problem of multi-co linearity. The results did not exhibit the seriousness of the multi-colinearity

$$\begin{array}{l}
 Y = a_0 \frac{1}{1 - b_1 - b_2 - b_3 - b_4} \left[\begin{array}{c} b_1 \\ P_1 \end{array} \right] \frac{1}{1 - b_1 - b_2 - b_3 - b_4} \\
 \left[\begin{array}{c} b_2 \\ P_2 \end{array} \right] \frac{1}{1 - b_1 - b_2 - b_3 - b_4} \left[\begin{array}{c} b_3 \\ (p_1) \end{array} \right] \frac{1}{1 - b_1 - b_2 - b_3 - b_4} \\
 \left[\begin{array}{c} b_4 \\ P_4 \end{array} \right] \frac{1}{1 - b_1 - b_2 - b_3 - b_4} \quad P_y \frac{b_1 + b_2 + b_3 + b_4}{1 - b_1 - b_2 - b_3 - b_4}
 \end{array}$$

problem. Hence the data in original form were fed to the computer for regression analysis.

From this production function, the supply function was derived and its general form was as follows:

$$Es = \frac{dy}{dp} \left(\frac{p}{y} \right)$$

RESULTS AND DISCUSSION

Results of the present study are presented and discussed below

TABLE - 1 : Per day Estimates of Feed cost, Milk yield and Feed cost/ Rupee of Milk Output of Cows and Buffaloes among different categories of Households.

Categories of Households	Animal	Feed cost	Milk yield per day per day	Feed cost per litre (litres)	Milk price per litre	Feed cost per Rupee of Milk Output
Marginal (27)	Cow	63.24	9.3	6.80	10.25	0.66
	Buffalo	67.56	10.1	6.69	11.17	0.59
Small (19)	Cow	65.83	9.9	6.65	11.25	0.59
	Buffalo	72.43	11.3	6.41	11.61	0.55
Large (14)	Cow	58.85	10.2	5.77	11.98	0.48
	Buffalo	71.95	12.6	5.71	12.67	0.45
Pooled (60)	Cow	63.04	9.7	6.50	10.97	0.59
	Buffalo	70.40	11.06	6.37	11.66	0.54

Where, P_1 , P_2 , P_3 and P_4 are the unit prices of X_1 , X_2 , X_3 and X_4 respectively and P_y is the price of 'y'. By substituting the estimated values of a_0 , b_1 , b_2 , b_3 and b_4 in the supply function along with the prices, supply function was estimated. The supply response to changes in price can be studied by working out the elasticity of supply at different price levels. If $Y = t(p)$, is the supply function, then the elasticity of supply (E_s) is defined as

Table-1, presents the estimates of five economic variables relating to the cost of production of cows and buffaloes milk. These variables are milk yield, feed cost, feed cost per litre of milk, price per litre of milk and feed per rupee of milk output.

The results of the study irrespective of farm size classes, established the superiority of buffaloes over cows at least in respect of three important economic variables viz; feed cost, milk yield and milk prices. This was obviously due to the fact that the consumption and absorption of better quality feed as measured in terms of increased expenditure on feed fed coupled with inherent genetic

potentiality of buffaloes led to better quality of milk production. This was true for all the farm size classes. As such, the price per unit of buffalo milk was Rs.11.66 per litre. This suggested that the feed milk conversion quality attributes was the highest in case of buffaloes than that in case of cows. The increase per day milk yield of buffaloes over cows nullified the increased feed costs resulted in a lower feed cost per litre of milk in case of all farm size classes. But in case of large farms, the feed cost per litre of buffalo milk was the minimum (Rs.5.71) followed by cow's milk (Rs.5.77). The net outcome of this superiority of buffaloes over cows at the overall level was reflected in the low feed cost per litre of milk (Rs.6.37 in case of buffaloes as against Rs.6.50 in case of cows) and feed cost per rupee of milk output was Rs.0.54 in case of former and Rs.0.59 in case of the later respectively.

But a comparison of these estimates i.e., feed cost per day, feed cost per litre of milk and feed cost per day, feed cost per rupee of milk output obtained for cows and buffaloes reared by different categories of farmers did not show any marked difference. The superiority of large size farms over the marginal and the small farms in simultaneous rearing of cows and buffaloes was evident from the fact that the feed cost per rupee of milk output was less than 50 paise in case of the former, while in the remaining categories of sample farms, it exceeded 50 paise.

In sum, it is the feed milk conversion attribute, which was found to form the crux of the problem of milk production technology.

Further, with a view to examining the details of the factors that contributed to the level of milk production in the study area, production function analysis was carried out by disaggregating the feed costs into three broad constituents viz; cost of green fodder, cost of dry fodder and cost of concentrates. The relevant statistics to this effect are presented in Table-2.

The results of the production function analysis indicated that at the aggregate level, while green fodder and dry fodder fed to milch cattle had a negligible impact on the quantum of milk yield, the concentrate had a positive significant impact on milk yield of both cows and buffaloes. In addition, number of milch animal had an equal positive and significant impact on milk yield. Another noteworthy feature revealed by the functional analysis was that the elasticity coefficient of concentrates was substantially higher for buffaloes than those obtained for cows. This lends support to our earlier observation that absorption and conversion of concentrates into milk was higher for buffaloes than for cows.

TABLE-2 : Regression Coefficients and Other Related Statistics

Variables	Marginal		Small		Large		Pooled	
	Cow	Buffalo	Cow	Buffalo	Cow	Buffalo	Cow	Buffalo
Green Fodder (X_1)	-0.436	-0.284	-0.132	-0.249	0.086	0.119	-0.327	0.197
Dry Fodder (X_2)	-0.172	-0.189	-0.284	-0.076	0.352	0.182	0.215	-0.245
Concentrates (X_3)	0.031	0.356	0.128	0.612	0.297	0.098	0.118	0.184
Number of Milch Animals (X_4)	0.082	0.024	0.084	0.021	0.028	0.175	0.072	0.089
Constant	0.827	1.286	0.349	0.674	1.421	0.782	1.246	0.998
R^2	0.57	0.59	0.61	0.58	0.58	0.60	0.62	0.59
n	27	27	19	19	14	14	60	60

. significant at 5 percent level

.. significant at 1 percent level

Analysis of production function estimates between size groups indicated that in case of marginal and small farms both green fodder and dry fodder seemed to have least impact on milk yield of cows and buffaloes. The negative but significant coefficients associated with these two variables implied that green fodder and dry fodder fed to milch animals of these two categories of sample farms in excess of requirement. This is quite obvious in view of the fact that in the absence of adequate grazing land, the sample farmers generally collect grass from different fields after day's work or on off-days to feed the wet milk cows in anticipation of best substitute for concentrates, which was found to be of little relevance in the present study. But concentrates had a positive significant impact on milk yield of both cows and buffaloes. The number of wet milch animals appeared to be another important factor influencing milk yield of cows and buffaloes. But in case of large farms, green fodder, dry fodder and concentrates had a positive significant impact on milk yield of cows and

buffaloes. The milk yield also bore a direct positive relationship with the number of wet milch cows and buffaloes on this category of farms.

The supply function was estimated on the basis of pooled data. As it is evident from the table that all parameters were found significant in both the functions estimated for cows and buffaloes separately. By substituting the values of a_0 , b_1 , b_2 , b_3 and b_4 in the supply function along with the prices of X_1 , X_2 , X_3 , and X_4 , we get

$$\text{Cows} \quad : \quad y = 0.0526 p_y^{5.7296}$$

$$\text{Buffaloes} \quad : \quad y = 0.1867 p_y^{4.4683}$$

The elasticity of supply for cow milk and buffalo milk was 5.7296 and 4.4683 respectively. This indicates that the supply of both cow and buffalo milk is highly elastic. One percent increase in the price of cow milk leads to 5.7296 percent increase in the supply of cow milk and one percent increase in the price of buffalo milk leads to .4683 percent increase in the supply of buffalo milk. This suggests that milk supply in the area can considerably be stepped up in the short-run by increasing the prices of milk.

CONCLUSIONS

Based on these findings, it may be inferred that the milk yield of cows and buffaloes is highly dependent upon the number of milch animals and the quantum of concentrates fed to these animals. Except in case of large farms, green fodder and dry fodder did not seem to influence the milk yield in the remaining two categories of sample farms. In other words, there exists scope for enhancing milk yield by feeding more of concentrates to milch animals instead of depending upon dry and green fodders alone. But in the absence of adequate purchasing power of marginal and small farmers to the needed concentrates, judicious and balanced combination of three components was not possible to take advantage of the inherent potentiality of crossbred cows. The milk supply in the area can considerably be stepped up by revising the price in favour of the milk producers.

The Andhra Pradesh Dairy Development Co-operative Federation (APDDCF) can play a key role in fulfilling the above task.

References

1. Goel, A.K. Indian Agriculture from Independence to 21st Century, MANAGE Publication.
2. Vision-2020, Swarna Andhra Pradesh, Govt. of Andhra Pradesh, 1999.

**PROCEEDINGS OF THE NATIONAL SYMPOSIUM
ON "RAINFED AGRICULTURE"**

The national symposium on "Rainfed Agriculture was organized by the National Institute of Agricultural Extension Management (MANAGE), Hyderabad. The symposium was held from June 7-9, 2000 at the Institute.

The presidential address was delivered by Dr.M.V.Nadkarni, vice-chancellor, Gulbarga University, Gulbarga. The keynote paper was presented by Dr.H.P.Singh, Director, CRIDA, Hyderabad. The inaugural session was chaired by Dr.J.P.Singh, Director, MANAGE. Dr.K.H.Vedini, Programme Officer, MANAGE, Co-ordinated the Symposium. 70 papers were received, of which 20 were presented and discussed during the symposium. Major recommendation / conclusions that emerged from the symposium are as under.

1. Watershed Development Programmes must be given top priority in all dryland areas of the country.
2. Besides Management of Natural Resources like land and water, other components such as, Social Resource Management and livelihood support system must be emphasized in dry land areas.
3. The farmers in dryland farming are generally resource poor. Government must make improved and innovative policies in helping farmers through better and easy lending procedures by financial institutions. Similar innovative and dynamic insurance policy should be framed and implemented to help dryland farmers.
4. Crop planning technique should be followed for Judicious use of water in dryland areas.
5. People's participation must be given top priority for sustainable development of watershed programmes in dryland area.
6. Evaluation studies on Watershed Development Programme should be carried out to assess the viability of the programme.
7. Establishment of Agro-processing Units by farmer groups in dryland areas may be encouraged with financial assistance from SFAC on equity basis.

