

## **CASE STUDY ON GROUNDNUT CULTIVATION IN COASTAL SANDY SOILS IN SPS NELLORE DISTRICT OF ANDHRA PRADESH**

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### **ABSTRACT**

The case study was undertaken to document the cultivation practices from seed to seed and issues related to the intensive cultivation of groundnut crop in coastal sandy soils during Rabi season of 2018-19. A total of around 4000 acres is spread in a single patch of area, wherein, farmers from 10 habitations in three revenue villages cultivate groundnut as mono crop as their main livelihood since last three decades as a common group activity. The farmers are following their own groundnut cultivation package of practices tried and tested by themselves to suit their coastal sandy soils ecosystem. The unique cultivation practices the farmers are following include taking up uniform crop calendar, use of single variety viz., TAG 24, seed rate 200-240 kg of kernels per acre, use of own seed, sowing by seed drill, cent percent seed treatment, use of higher doses of weedicides, higher rate of fertilizer application, sprinkler irrigation, contract mode of labour for operations and sheep penning. Some of the identified constraints as perceived by the farmers include lack of advanced suitable short duration varieties, lack of recommended package of practices, lack of combined harvester and threshers, labour shortage during peak season, water shortage during drought years and no storage facility. SWOT analysis indicates some of the important aspects to be strengthened, attended and addressed for sustainable development of groundnut cultivation in the study area.

**Keywords** : Groundnut cultivation, Coastal sandy soils, Package of practices, Constraints in cultivation and SWOT analysis.

### **INTRODUCTION**

India has an extended coastline of approximately 7516.6 km (mainland 5422.6 km and Island Territories 2094 km) (CCZMCSB, 2020) and the State of Andhra Pradesh is one of the coastal states having 974 km length (EDB, 2020) of coastal lands. SPS Nellore district is one of the coastal districts of Andhra Pradesh which is having a coast line of 163 km length (CPO, 2018) of Bay of Bengal on East.

Groundnut is an important commercial crop in Andhra Pradesh cultivated in an extent of 7.35 lakh hectares (DES, 2018) in various types of soils but predominantly grown in red soils. As groundnut crop grows well in loose textured soils, it is being cultivated in some locations of coastal sandy soils in SPS Nellore, Prakasam, Guntur and Krishna districts of Andhra Pradesh.

Coastal sandy soils are predominant along the coast line and are characterised by light texture with poor nutrient status, low Cation

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Exchange Capacity (CEC) and soil organic matter coupled with low microbial activity, deficit in zinc and boron (Singaravel *et al.*, 2005). To add, these coastal sandy soils have low water holding capacity, low fertility and non-suitability for majority of crops, thus creating complex management problems for farmers to cultivate crops (Caldwell *et al.*, 2005). In spite of the adversities due to poor soil conditions, still, farmers are cultivating groundnut crop with unique local practices for sustaining their livelihood in their coastal sandy soils.

One such case is coastal sandy soils in Vidavaluru mandal of SPS Nellore district in Andhra Pradesh. Spread across ten habitations in three revenue villages of the mandal, a stretch of around 4000 acres in a single geographical areas under intensive monocropping of groundnut crop since last three decades. Groundnut cultivation is the only livelihood for all the farmers in study area. The farming community comprises majorly of small and marginal farmers with an average land holding ranging from 3 to 20 acres. Earlier, farmers cultivated yam, vegetables, greens in their sandy soils, and later all the farmers switched to cultivation of groundnut crop (as mono crop) since last three decades because of higher returns. All the farmers in the area adopted similar cultivation practices like following one crop calendar, common package of practices, common set of inputs, group marketing, etc. Presently, a set of recommended groundnut cultivation practices are available for red loamy soils and red soils, but they are largely differing

from the practices being followed by the farmers in the study area. As the cultivation in coastal sandy soils required entirely a new set of practices and inputs with varied doses and their mode of application, farmers started cultivating groundnut crop with their own practices and refining them on a trial and error basis since last three decades. At present, farmers were practicing a set of cultivation practices like more seed rate, excess fertilizer application, dense plant population, single variety cultivation, more frequent irrigation, etc., which are entirely different from the regular groundnut cultivation practices available for red sandy loamy soils.

The farmers cultivating groundnut in coastal sandy soils were in need for location specific groundnut production technology for reduction of cost of cultivation and more quality yield. Case studies will explore complex interventions of the farming community in special conditions (Yin, 2003). To feed the research and extension systems with a real-time situation of groundnut cultivation in coastal sandy soils, this case study was taken up to understand the various cultivation practices, inputs usage patterns, returns, etc. The study aimed at documenting farmers' practices such that these can be taken up by the research system to develop a suitable groundnut production technology for coastal sandy soils. Further, the study also aimed to document the constraints as perceived by farmers and to identify the Strengths, Weaknesses, Opportunities and Threats (SWOT) of cultivating groundnut in coastal sandy soils.

## MATERIAL AND METHODS

A descriptive case study design was adopted for the purpose and cultivation of groundnut in coastal sandy soils in real-life context in which it occurred was studied (Yin, 2003) ten habitations in three revenue villages viz., Varini, Utukuru and Mudhivarthi of Vidavaluru mandal of SPS Nellore District during *Rabi* season of 2018-19. In the study area, three Focus Group Discussions (FGD) were conducted involving 20 key informant cultivating farmers. The key informants were selected based on their experience in the groundnut cultivation (more than ten years). Focus group discussion is a technique where a researcher assembles a group of individuals to discuss a specific topic, aiming to draw from the complex personal experiences, beliefs, perceptions and attitudes of the participants through a moderated interaction, Morgan, 1996).

An open-ended format was prepared to document diverse aspects during FGD in a

systematic way covering cultivation aspects from seed to seed and other related aspects. The content collected during group discussion was cross checked with the selected key informants in the study area and later entire cultivation practices from seed to seed was arranged in a systematic schemata and constraints being faced by the farmers while cultivating the groundnut crop in coastal sandy soils were recorded. To get more insight into the pros and cons, strengths, weaknesses, opportunities and threats (SWOT) analysis was also carried out cultivation in Coastal sandy soils more sustainable by addressing major issues of concern.

## RESULTS AND DISCUSSION

The cultivation practices being followed by the farmers in the study area and observations recorded (Table 1) are as follows:

**Table 1. Cultivation practices followed by the farmers in Coastal sandy soils**

Aspects	Practices followed by the farmers	Observations
Seasons	First Season - May 15th - June 15th to October Second season - December to March	Farmers cultivate in two seasons. All the farmers follow the similar crop calendar.
Variety	TAG 24	Since last ten years farmers were cultivating only one single variety viz., TAG 24. Farmer preference for this variety was due to its short stature, early maturity (less than 100 days), suitable for high density sowing, higher yield and availability of market for table purpose.
Source of seed	Own seed stored in gunny bags	All the farmers retain their own seed for the next season and this is happening since decades. This helped them for taking timely sowing. Use of own seed also reduced the cost to incur for the seed procurement besides maintaining quality of the seed.

Table 1 Contd...

Aspects	Practices followed by the farmers	Observations
Seed rate and spacing	Seed rate 200-240 kg kernel per acre of land	Very high seed rate was used for dense planting (100 plants per square meter).
Preparatory cultivation	Tractor drawn Cultivator	Entire operation was done on per acre contract basis for all the farmers at the same time.
Sowing	Tractor mounted seed drill	Complete sowing operation in the entire area is undertaking with tractor mounted seed drill on contract hire basis @ Rs. 1000 per acre. Some innovative farmers in the study area brought seed drills ten years before and now all the farmers were using the 16 tyned seed drill for sowing operation. At present, many farmers now own these type of seed drills.
Seed treatment	Seed treatment with Mancozeb 45 and Carbendazim	Each and every farmer follow seed treatment without fail to curtail soil borne pathogens.
Weed management	<p><b>Pre-emergence:</b> Pendimethalin (or) Butachlor @2 -2.5 litre per acre (or) Pendimethalin 1litre + Butachlor 1 litre in 200 litres of water by power sprayers (8-9 tanks per acre)</p> <p><b>Post emergence:</b> Two hand weedings at 20 and 40 days after sowing</p>	Pre-emergence weedicides were being applied at higher rate than the recommended (recommend dose @1 litre per acre. Crop was maintained weed free for the entire season with two hand weedings manually.
Manures	FYM @ 2 t per acre per year	In spite of less availability and high cost during the sowing season all the farmers are still applying at least two tonnes of FYM per acre.
Fertilizers	<p>Basal: Urea - 50kg per acre; SSP 150 kg per acre</p> <p>I Topdressing at 20DAS: 28:28:0 @ 50 kg per acre; Urea @ 25 -50 kg per acre</p> <p>II Top dressing at 40 DAS: 50 kg of 14:35:14 per acre and Urea @ 25-50 kg per acre. Gypsum @200 kg per acre</p> <p>III Top dressing at 60 DAS: Urea @ 25-50 kg per acre</p>	When compared to the recommended dose of fertilizers for red loamy soils, farmers in the study area were applying very high dose of fertilizers. Due to more leaching of nutrients, very high plant density and continuous irrigation for every three to five days during the entire crop season, farmers opted for applying more fertilizers to replenish the nutrient availability to the crop. Farmers were resorting to use of complex fertilizers to overcome the labour shortage that is required for mixing and application of straight fertilizers.

Aspects	Practices followed by the farmers	Observations
Irrigation water management	Sprinkler irrigation for entire area	Entire area is under sprinkler irrigation systems. Water is available in tube wells at 20 feet depth. Irrigation was given for every three to five days for the entire crop season. Recently, some farmers adopted micro sprinklers (@10 raisers per acre) to save water. For all the fields, irrigation operations were done by specially skilled labour on contract basis @ Rs.2000 per month per acre. One skilled man has been engaged for every six acres.
Pest and Diseases	Insects viz., Spodoptera and diseases viz., leaf spots, Stem and Bud necrosis are common	A total of 8-9 sprays with different mix of agro-chemicals were applied during one cropping season as per the availability of chemicals.
Harvesting & Heaping	Manual harvesting	Harvesting was done with 25 women labour per acre. Some farmers were completing the harvesting on contract basis @ Rs. 5000 per acre. After harvesting farmers used to leave the harvested crop in their fields itself for five days to dry and make it ready for threshing.
Threshing and separating pods	Machine threshing. Around 100 machines were available in the area.	Farmers were using local threshing machine on rental basis @Rs.4000 per acre and completes in three hours. After separation, pods allowed to dry in the field itself for one day.
Bagging	Plastic sheet bags of 40 kg of pods.	Farmers take the portion of the produce for storing in gunny bags for the seed purpose for next season and remaining produce was bagged for sale in plastic bags.
Yield range	45-55 bags per acre	Ranged from 1800 -2200 kg pods per acre. Some farmers harvesting 2600 - 2800 kg pods per acre.
Haulms	Left in the field for sheep feeding.	After threshing, the haulms, were left in the field itself. Sheep herds (about 20-25 herds with 400-500 sheep in each herd) from the nearby areas visit the harvested fieldsto feed on the haulms by staying around 45-60 days. The farmers were being benefited by sheep penning for enriching their soil.
Farm Mechanization	Adopting mechanization for many farm operations	Due to intensive cultivation and for taking timely operations on a common crop calendar basis farmer opted for more mechanization and using machines for field preparation, sowing operations, spraying of agrochemicals, irrigation and threshing operations. During the study, farmers expressed their need to have a combined harvester and thresher to harvest the produce in less time and also to overcome the labour shortage during the harvesting time.

Aspects	Practices followed by the farmers	Observations
Marketing	Buyers come to fields during harvesting season. Other area farmers also buy for seed purpose.	As the entire area of around 4000 acres was in one location and availability of large quantity of produce, the buyers came to the fields to purchase the produce. These farmers are supplying majority of seed required by the other farmers in the district for sowing Khairf season crop from the Rabiseason crop produce. There is huge potential for groundnut seed production in the study area.

**Table 2. Major constraints perceived by the farmers in the study area with regards to groundnut cultivation in coastal sandy soils**

S. No.	Perceived Constraint	Priority Rank
1	Lack of improved short duration varieties suitable for coastal sandy soils	I
2	Lack of recommended package of practices for coastal sandy soils	II
3	Lack of combine harvester and threshers to overcome labour problem	III
4	Labour shortage during peak season	IV
5	Water shortage during drought years leading to reduced area under cultivation	V
6	Lack of facility for storage of the produce for better market price or for storing it for seed purpose	VI

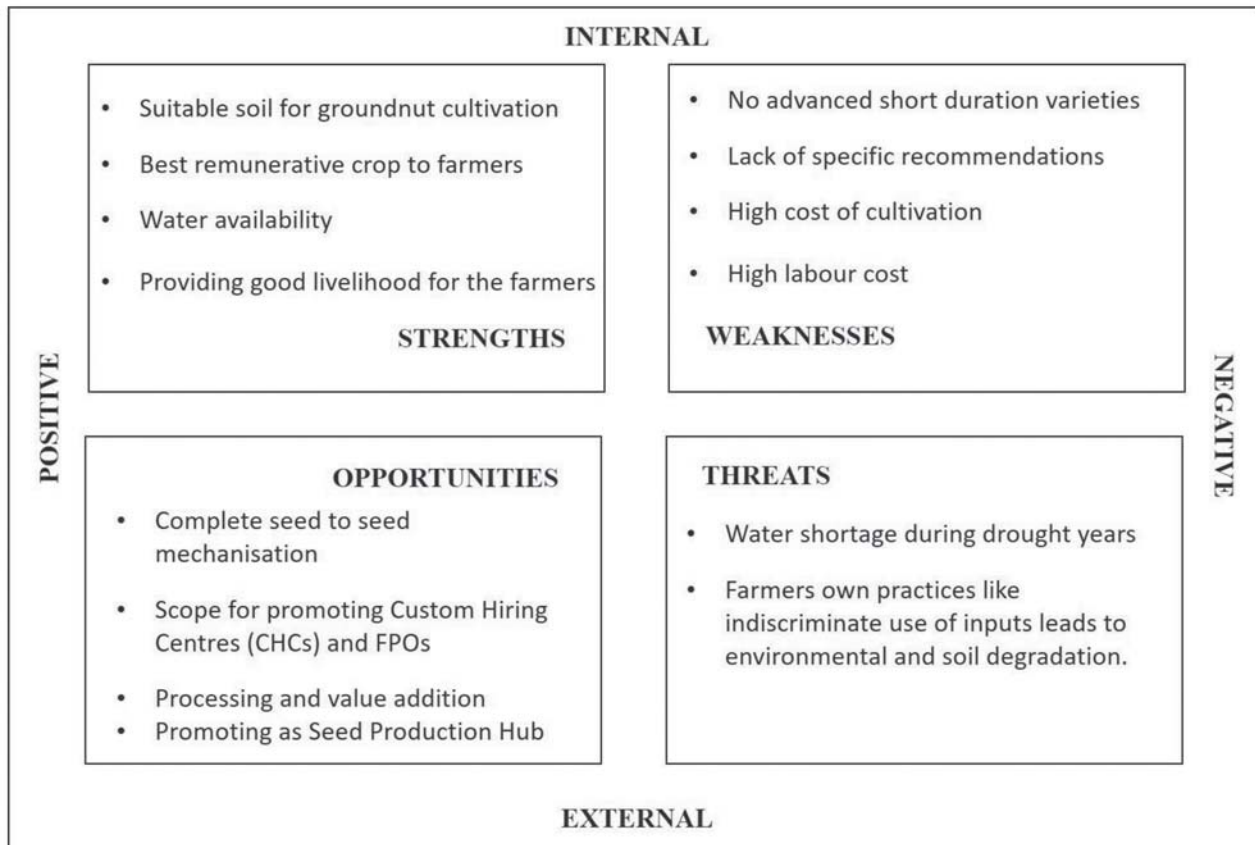
The constraints perceived by the farmers were prime importance to consider and work out the strategies for reducing losses and address them by developing cost reduction cultivation technologies. Few constraints such as 'lack of improved short duration varieties' and 'research based recommended package of practices' can be taken up as future researchable issues (Table 2). The constraint of lack of storage facility can be addressed by establishing seed godowns so that intensive seed production activity can be taken up.

#### **SWOT Analysis of groundnut cultivation in Coastal sandy soils**

SWOT analysis results (Fig. 3.) reveal that the strengths identified during SWOT analysis include high suitability of the soil for groundnut cultivation, no alternative suitable and remunerative crop other than groundnut and more irrigation water availability and good livelihood for the farmers. When opportunities were examined, there was a possibility of complete seed to seed mechanisation of groundnut cultivation, promotion of Custom Hiring Centres (CHCs) for farm machinery, initiating Farmers Producers Organisation (FPO) especially for seed production, instead of selling the pods in the field as bulk to the traders, farmers can start processing and value

addition activities As area is under intensive cultivation of groundnut, the entire area or a significant part of the area can be promoted as

seed production hub by the competent seed agencies.



**Fig. 3. SWOT analysis of groundnut cultivation in coastal sandy soils in SPS Nellore District**

The major weaknesses were non-availability of suitable short duration varieties, lack of specific package of practices / recommendations suitable for coastal sandy soils, high cost of cultivation due to heavy application of inputs and more labour cost. On the other hand, the perceived threats include water shortage in the tube wells during the drought years leading to the reduction in the area of cultivation. Due to lack of recommend package of practices, farmers own practice and desire to take more yield led to indiscriminate use of inputs and there by leading to soil and environment degradation.

**CONCLUSION**

The case study documented the groundnut crop cultivation practices being followed by the farmers as a group in coastal sandy soils of SPS Nellore district. Even without standard location specific recommended package of practices coastal sandy soils in the study area, farmers were intensively cultivating the groundnut crop since decades. The documented practices will become a source for formulating researchable issues for development of suitable package of practices in these ecosystems. The researchable issues as detailed in this case study will

help to conduct the On-farm research in the study area in Participatory Technology Development (PTD) approach to develop interventions and suitable location specific technologies which may also be useful for similar coastal sandy soils ecosystems where groundnut is being cultivated. There is a huge potential in this district to promote Custom Hiring Centres (CHCs) mechanisation, development of Farmers Producers Organisations (FPOs), promotion of processing centres, and seed production hub.

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