Indian Journal of Agricultural Sciences **91** (12): 1768–72, December 2021/Article
https://doi.org/10.56093/ijas.v91i12.120803

Impact of direct cash transfer scheme on production and efficiency of groundnut cultivation in Karnataka

KAVITHA H N[1], PRAMOD KUMAR[1]*, ANBUKKANI P[1] and R R BURMAN[1]

ICAR-Indian Agricultural Research Institute, New Delhi 110 012, India

Received: 15 December 2020; Accepted: 19 July 2021

ABSTRACT

The Central government efforts to help the farmers by providing fund to meet the agricultural and other household needs through direct benefit transfer has gained importance in the recent years. The present study was carried out in Tumkur district of Karnataka 2020 with the objetives; To evaluate the utilization pattern of PM-KISAN scheme and; To analyse the impact of PM-KISAN scheme on technology adoption and on during farm income. The study revealed that the timely transfer of fund has helped farmers in carrying out timely agricultural opertions.The scheme has enabled greater proportion of beneficiary farmers to adopt improved production technology, realisation of higher amount of gross returns from groundnut production as compared to that by non-beneficiaries. The increase in gross returns is found to be due to not only use of right kind and dosage of inputs but also due to adotion of improved production technology. The timeliness of receipt of installment amount influenced its use for agriculture purpose leading to generation of higher income. The PM KISAN scheme is beneficial to farmers and needs to be popularized.

Keywords: Decomposition analysis, Data envelopment analysis, Groundnut prodution, Impact of PM KISAN scheme, Technology Adoption Index

The government of India has taken a number of steps like raising MSP, promoting micro-irrigation technology, broadbasing the insurance scheme, etc. to overcome the farm distress. In the same effort the country has launched PM-KISAN (PM Kisan Samman Nidhi) Yojana with effect from 1.12.2018. It involves payment of ₹ 6000 to the farmers in three installments with ₹ 2000 each through direct benefit transfer.The scheme is intended towards meeting the agriculture input requirement of the farmers as also other household needs (Kaivtha *et al.* 2020). Thus, it is expected to enable the farmers to adopt the latest crop technology leading to enhancement in yield and income of the farmers. The amount is of greater importance specially for small and marginal farmers who are deprived of credit facilities to take up agricultural activities and continue in farming. Groundnut is the major oilseed in terms of production as well as important cash crop of our country. The kernels are consumed either roasted or fried and salted. Groundnut kernel contains about 47–49% oil and 20% protein. Groundnut oil is primarily used in the manufacturing of vegetable ghee. The area under groundnut in Karnataka has fallen from 8.48 lakh ha in 2010 to 5.7 lakh ha in 2015–16 and production has fallen from 7.42 lakh ton to 3.95 lakh ton during the same period. Major varieties recommended for Karnataka are KCG 2, KCG 6, GPBD 4, ICGS 11, ICGV 9114, TMV 2, JL 24, DH 3-30, K 134, VRI 2. It is now important to study the implications of PM KISAN scheme on adoption pattern of the crop production technology, yield and income of the farmers of Tumkur district of Karnataka.

MATERIALS AND METHODS

Multistage random sampling plan was followed to draw sample farmers for the study (2020). Karnataka state was purposively selected to study effectiveness of PM-KISAN yojana, as in the state only this scheme was operating, while in many other states along with PM-KISAN, state specific investment support schemes are also in operation. Tumkur district was purposively selected as it is a dry region and majority of the farmers are small and marginal and an income support of ₹6000 per annum per farm family plays an important role in such region. Two blocks, namely Gubbi and Kunigal blocks representing two different climatic zones and within each block, one Hobli was randomly selected. In subsequent stratification, cluster of villages comprising two to three villages from each Hobli was selected randomly. Thus, 120 farmers comprising both beneficiaries and non-beneficiaries of the PM-KISAN scheme were selected for detailed survey using well structured schedule. The data

Present address: [1]ICAR-Indian Agricultural Research Institute, New Delhi. *Corresponding author e-mail: pramod.iari@gmail.com.

from various stakeholders involved in the implementation of the scheme like state department of agriculture, revenue department, etc., was also collected. Finally, the enumeration of groundnut producers was taken up to elicit information on socio-economic characteristics, level of adoption of production technology, input use, resource use and returns.

The extent of adoption of technology by farmers was computed by composite technology adoption index (CTAI) as;

$$CTAI_i = \Sigma w_{ij} x_{ij}$$

where x_j, adoption of recommended technologies, viz. soil testing, ploughing, variety, seed rate, seed treatment, spacing, time of sowing, inter cultivation, FYM application, fertilizers, weed management, plant protection. The technology for which the farmer was following the recommended package of practice is given a score of '1' and '0' otherwise. The w_j, is the weight assigned to production technology and was computed through principal component technique (Manaswi *et al.* 2020). The various cost concepts were used to analyse the profitability of the groundnut crop (Manaswi *et al.* 2019, Manaswi *et al.* 2020).

The actual level of adoption of technology by farmer was compared with recommended package of practices of University of Agricultural Sciences, Bengaluru. The ratio of actual adoption of technology to recommended level of technology gives the extent of adoption of technology (Manaswi *et al.* 2019, 2020)**.**

$$EA = \frac{\text{Actual adoption}}{\text{Recmmended technology}} \times 100 \quad (1)$$

Development of Composite Index: The Principle Component Analysis (PCA) was used forcomputing weight for different technologies (Manaswi 2020).

The function for deriving composite adoption index is given by equation 2,

$$S_i = W_1EA_1 + W_2EA_2 + ... + W_nEA_n \quad (2)$$

Where, S_i is Composite adoption index score and EA_i's are the adoption scores for individual component of technology.

Farm business analysis: The sample farmers were classified into two categories, i.e. beneficiary farmers and non-beneficiary farmers of PM-KISAN. The beneficiary farmers are supposed to have relatively higher level of technology adoption due to use of quality inputs. The impact of the technology adoption was assessed in terms of enhancement in yield, income, and improvement in efficiency. The various cost concepts were used to analyse the profitability of the groundnut crop (Manaswi *et al.* 2019, 2020).

Data Envelopment Analysis Approach (DEA): It is a non-parametric linear programming approach for evaluating the performance of groundnut farmers. It calibrates the technical efficiency on the basis of estimated best-practice or efficient frontier or envelopment surface made up by a set of Pareto-efficient farmers (efficiency scrore=1). The efficiency of the firms is calculated in relation to this and efficiency score thus obtained lies between between 0 and 1. To estimate the technical efficiency the envelopment form of the linear programming problem using the duality is shown as equation 3 (Yogi 2019).

$$\begin{aligned} &\min_{\theta,\,\lambda}\ \theta, \\ &st\ -y_i + Y\lambda \geq 0, \\ &\theta x_i + Y\lambda \geq 0, \\ &\lambda \geq 0, \end{aligned} \quad (3)$$

Where θ is a scalar and λ is a N × 1 vector of constants. The value of θ is the efficiency score for the i^{th} firm.

Resource use efficiency: Cobb-Douglas production function of the form $Y=a + b_1X_1 + b_2x_2 + ...b_nX_n$ was estimated separately for beneficiaries and non-beneficiaries of PM-KISAN scheme to estimate efficiency of input use. Where, Y is the gross returns in ₹ per acre, X_i is seed, FYM, poultry manure, labour, machinery, fertilizers/organic manures, irrigation and plant protection/bio pesticides taken in value terms (₹/acre). Resource use efficiency in groundnut production among the beneficiaries and non-beneficiaries of PM-KISAN scheme was estimated by computing ratio of MVP of the input to its price. If the ratio is less than unity, it indicated that the input is over-utilized and if it is greater than unity it is under-utilized.

The contribution of technology and input use in increasing gross returns of groundnut production of farmers was assessed using decomposition analysis (Solow 1957, Bisaliah 1977). The model was derived by taking difference between the Cobb-Douglas production function of beneficiaries and non-beneficiaries of PM-KISAN scheme.

RESULTS AND DISCUSSION

Socioeconomic characteristics of sample farmers: Marginal farmers accounted for the highest percentage (56.9%) of the total sample farmers and are followed by small (31.9%) and semi-medium (9.7%) category of beneficiaries of the scheme. Whereas, in the case of non-beneficiaries of PM-KISAN scheme, the marginal farmers were dominant group comprising 60% of the total farmers. The other categories of the farmers with a considerable share were small (30.8%) and semi-medium (7.5%), respectively. Out of all the beneficiary farmers under study, it was found that around 35% of them are illiterates while 28% of the farmers have education up to primary level and is followed by high school (24%), PUC (10%) and college (4.2%), respectively. In case of non-beneficiaries of the PM-KISAN scheme, it was found that 31% of the farmers are illiterates and 31% of them were found to be educated up to primary level and is followed by high school (19%), PUC (15%) and college (4.2%). It was also found 65% of the beneficiaries were male, while female accounted for just 35% of the total beneficiaries. Education and gender does not seem to be barrier for getting registered under the scheme. Farmers registered and received few or all installments are considered as beneficiaries of the scheme.

While farmers who are eligible but not registered under the scheme, registered but not received any installment and those not eligible under the scheme (exclusion category/ tenant farmers/agricultural laborers) are considered as non-beneficiaries of the scheme. Of the total sample size of 120 farmers, 72 farmers registered and received few or all installments and are considered as beneficiaries.

Utilization pattern of PM-KISAN beneficiaries: The utilization pattern of PM-KISAN beneficiaries was analyzed. It is observed that 64.6% of the farmers used first installment money for agriculture purpose. This was spent mostly on purchase of inputs (46.3%) followed by payment of wages (40.9%), feed and fodder for cattle (11.8%) and other expenditure (1.1%). While majority of the farmers who received second and third installment spent it on non-agricultural activities (49.9 and 60.05%) due to disbursal of amount in non-cropping season. The study area was predominantly rainfed region and only one crop in a year is taken up by majority of the farmers. The benefit received in off season find likely to be used for non-agricultural activities. Spending on different activities depends on the time of receiving the benefit. If the benefit is received during pre-sowing or sowing period, the amount would be mostly used for the purpose of ploughing, purchase of inputs like seeds, fertilizers, etc. If it is received late or after sowing is done, it would be used for carrying out intercultural operations and payment of wages. Hence utilization of amount on different activities depends on the timing of the disbursement of installment amount and stage of the crop or cropping period.

Adoption of groundnut production technology: Twelve groundnut prodction technologies namely, soil testing, ploughing, variety, seed rate, seed treatment, spacing, time of sowing, inter-cultivation, FYM, fertilizers, weed management and plant protection were considered for evaluating the differences in adoption due to PM-KISAN scheme. It was observed that there is improvement in adoption level of technology for beneficiaries (45.7%) over non-beneficiaries (40.6%) on overall basis. The cultivation practices like time of ploughing, spacing and seed rate practices were adopted by majority of overall farmers which accounts for 82.0, 79.1 and 77.6%, respectively. More than 50% of the beneficiary farmers adopted technologies like ploughing, seed rate, spacing, time of sowing, inter-cultivation, fertilizers and weed management. In case of non-beneficiary farmers it was for ploughing, seed rate, spacing, time of sowing, inter-cultivation and weed management. It is observed that very few beneficiary (8.5%) and non-beneficiary (6.2%) farmers adopted improved or recommended varieties.

The weights to the different technologies which are highly contributing to the gap in adoption level were measured using Principal component analysis. Among the different groundnut production technology practices adopted by the farmers seed treatment obtained the maximum weight of 0.114. Some of the other practices which received higher weights were FYM, soil testing and time of sowing etc. Intercultivation obtained the least with the weightage of 0.055 followed by variety and fertilizers with the weights of 0.061 and 0.064, respectively. These weights were used to arrive at the composite adoption index of groundnut production technology. Majority of the groundnut cultivating farmers of PM-KISAN scheme were medium and above level adopters 52.3 (%) of the recommended technologies while non-beneficiaries had only 45.5 (%). Very low level of technology adoption was only by 20.5 (%) of beneficiary farmers while the same was 25.7% of non-beneficiary farmers. This clearly reveals improvement in adoption of groundnut production technology enabled by PM-KISAN scheme.

Economics of groundnut production: Of the total cost, seeds contributed the highest share for both beneficiaries (28.6%) and non-beneficiaries (28.7%) followed by human labour (Table 1). The total input cost for beneficiaries was found to be ₹18470/, whereas it is ₹ 18023/ in case of non-beneficiaries. With improvement in liquidity due to PM-KISAN scheme the beneficiaries incurred more on purchase of inputs as compared to non-beneficiaries. The improvement in technology and use of appropriate inputs lead to realisation of higher gross returns (₹ 39880/) and B:C ratio (2.16) by beneficiaries compared to non-beneficiaries.

Resource use efficiency: The R- squared value of 0.86 and 0.84 revealing good fit of the Cobb-Douglas produciton function model for both beneficaires and non-beneficiaries

Table 1 Cost and returns in cultivation of groundnut for beneficiaries and non-beneficiaries of PM-KISAN scheme (₹/acre)

Particular	Beneficiary	%	Non-beneficiary	%
Human labour (Man days)	4472	24.2	4410	24.5
Bullock labour (Pair days)	1218	6.6	1183	6.6
Machine labour	1820	9.9	1600	8.9
Seeds	5289	28.6	5180	28.7
FYM	2750	14.9	2917	16.2
Fertilizers	1680	9.1	1490	8.3
Plant protection chemicals	120	0.6	142	0.8
Irrigation charges	252	1.4	236	1.3
Miscellaneous	439	2.4	439	2.4
Interest on working capital @7% annum	430	2.3	433	2.4
Total input cost	18470	100.0	18023	100.0
Yield (q/acre)	8.9		8.2	
Price (₹/q)	4200		4200	
Byproduct	2500		2500	
Gross returns	39880		36940	
B:C ratio	2.16		2.04	

Table 2 Estimates of Cobb-Douglass production function of groundnut for beneficiaries and non-beneficiaries of PM KISAN (₹/acre)

Parameter	Beneficiaries of PM-KISAN			Non-beneficiaries of PM-KISAN		
	Coefficients	Std Error	P>|t|	Coefficients	Std Error	P>|t|
Human labour	0.331***	0.049	0.045	0.342**	0.108	0.004
Bullock labour	0.004	0.022	0.225	-0.0005	0.025	0.985
Machine labour	0.053**	0.024	0.966	0.043	0.029	0.151
Seeds	0.292**	0.056	0.026	0.342**	0.114	0.01
FYM	0.152**	0.043	0.042	0.183**	0.071	0.017
Fertilizers	0.106**	0.059	0.020	0.083	0.054	0.135
Plant protection chemicals	-0.002**	0.002	0.873	-0.002	0.002	0.184
Irrigation	0.002*	0.001	0.186	0.0001	0.001	0.916
Intercept	2.868**	0.448	0.000	2.35*	0.894	0.053
R-squared	0.863			0.84		
Adjusted R-squared	0.821			0.78		
Prob> F	0.001			0.001		

*, ** and ***indicates significant at 10, 5 and 1 per cent level, respectively.

(Table 2).The inputs like human labour, machine labour, seeds, FYM, fertilizers, plant protection chemicals and irrigation were found to be significantly influencing the gross returns for beneficaries. While human labour, seeds and FYM were found to significantly influence the gross returns in non-beneficaires. It was observed that beneficiary farmers have under-utilized the resources, except bullock labour and plant protection chemicals. The non-beneficiary have under-utilized human labour, seeds and FYM. The availability of monetary resources from PM-KISAN scheme would provide scope for procuring and using more of resources and enhance production.

Decomposition of gross returns: The gross return of the beneficiaries of the scheme from groundnut crop was 8.09% higher than that of non-beneficiaries. Among the constituents of sources, the increase in gross returns due to increase in input use expenditure was 4.17 (%) while that due to adoption of production technology was 3.61 (%) (Fig 1 a, b). This phenomenal increase in the gross returns of beneficiaries of PM-KISAN was attributed to utilization

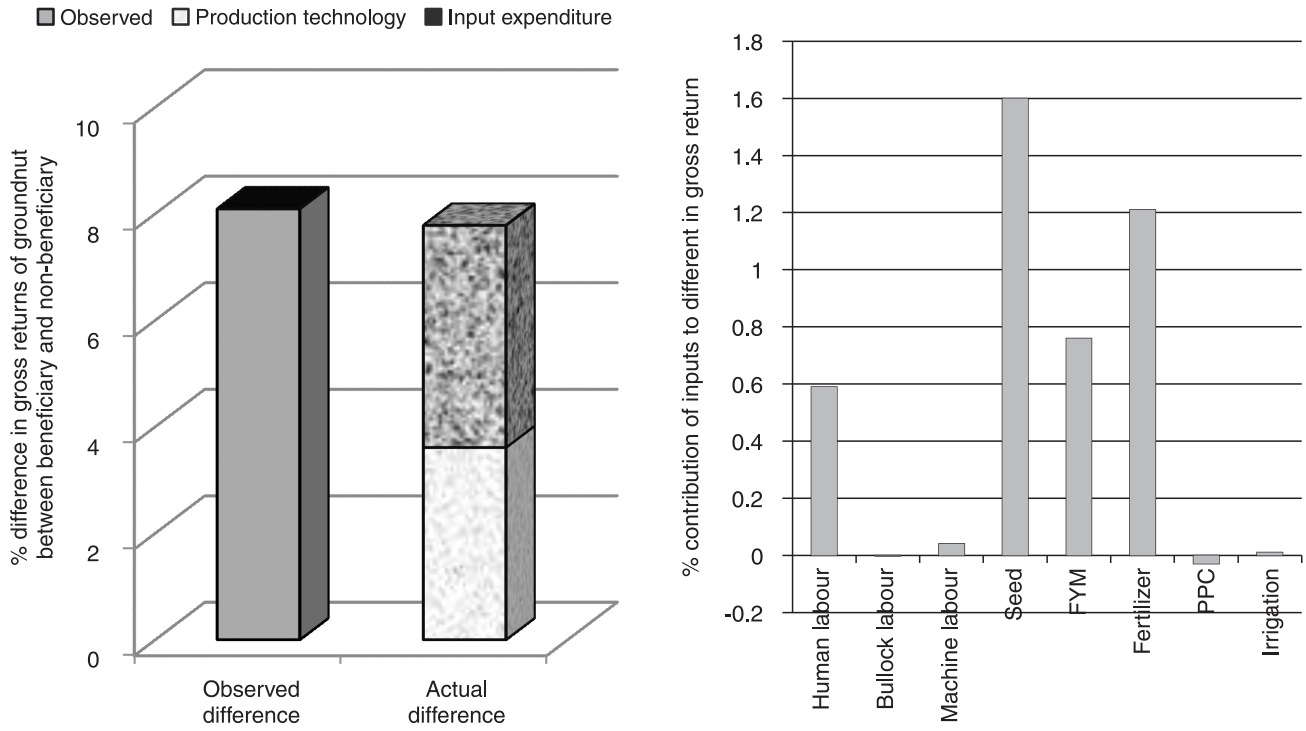

Fig 1 a. Decomposition of difference in gross return between beneficiary and non-beneficiary farmers. b. Estimated differences in gross retuns attributable to input expenditure (%)

of cash transfer for the purchase of timely and high-quality inputs. But the expenditure on inputs like bullock labour and plant protection chemicals in groundnut cultivation were found to be negatively contributing to the gap in gross returns between beneficiary and non-beneficiary farmers while the input expenditure on fertilizers (1.21), FYM (0.76) and seeds (1.60) were found to be positively influencing.

The PM-KISAN yojana was started on 1 December 2018 by the government of India to support farming sector by way of cash transfer of ₹6000 in three installments just before every crop season. The 64.6% of beneficiary farmers utilised the money for agricultural purposes. The purpose of utilisation varied depending on the time of receipt of the PM-KISAN money. There is an improvement in adoption of groundnut production technology as revealed from higher proportion of beneficiary farmers 52.3% lying in high and above adoption category as against 45.5% of non-beneficary falling in the category. With improvement in liquidity due to PM–KISAN scheme the beneficiaries (₹18470) incurred more on purchase of inputs as compared to non-beneficiaries (₹18023). The improvement in technology and use of appropriate inputs lead to realisation of higher gross returns (₹39880) and B:C ratio (2.16) by beneficiaries compared to non-beneficiaries. It is observed that the difference in the gross returns between beneficaires and non-beneficiaries is 8.09%. This increase in the gross returns of beneficiaries of PM-KISAN was attributed to utilization of cash transfer for the purchase of timely and high-quality inputs. Among the constituents of sources, the increase due to input use was 4.17% while that due to adoption of production technology was 3.61%. The programme has immense contribution in increasing productivity of agriculture. Hence, it is suggested that the programme be adopted by all the eligible farmers.

REFERENCES

Bisaliah S. 1977. Decomposition analysis of output changes under new production technology in wheat farming: Some implications to returns on research investment. *Indian Journal of Agricultural Economics* **32**(3): 193–201.

GoI 2017. Agricultural Statistics at a Glance, Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India

Kavitha H N, Pramod Kumar, Anbukkani P, Burman R R and Prakash P. 2021. Income support schemes: Evaluation of PM KISAN vis-à-vis State government schemes, Economic and Political Weekly **56**(34): 13–17.

Manaswi B H, Pramod Kumar, Prakash P, Kar A, Anbukkani P, Jha G K, Rao D U M and Lenin V. 2020. Impact of farmer producer organization on organic chilli production in Telangana India. *Indian Journal of Traditional Knowledge* **19**(1): 33–43

Manaswi B H, Pramod Kumar, Prakash P, Kar A, Anbukkani P, Jha G K and Rao D U M 2019. Impact of Farmer Producer Organisations on Organic Chilli (*Capsicum Frustescens*) production in Telangana. *Indian Journal of Agricultural Sciences* **89**(11): 1850–54.

Solow R M. 1957. Technical change and aggregate production function. *Review of Economics and Statistics* **39**(2): 57–69.

Sonawane K G, Pokharkar V G and Gulave C M. 2016. Impact of improved production technology of groundnut (*Arachis hypogaea* L.) on farm productivity and income in Western Maharashtra. *Journal of Oilseeds Research* **33**(2): 138–45.

Varshney D, Joshi P K, Roy D and Kumar A. 2020. *Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) and the adoption of modern agricultural technologies in Uttar Pradesh, India*. IFPRI discussion paper 01907, Jan 2020, International Food Policy Research Institute, South Asia Regional Office.

Yogi V, Pramod Kumar, Prakash P, Kar A, Singh D R, Singh R, Arya P and Awasthi O P. 2019. An Economic Evaluation of Kinnow Cultivation in North Western India. *Indian Journal of Agricultural Sciences* **89**(10): 1684–97.