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# Impact of Interventions of ICAR-KVK on Groundnut Cultivation and Socio-Economic Status of Farmers of Ariyalur District of Tamil Nadu, India

G. Alagukannan*, M. Thirumalaivasan and A. Rajkala

ICAR-Krishi Vigyan Kendra (Hosted by CREED), Ariyalur, Tamil Nadu (612 902), India

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**Corresponding Author**

G. Alagukannan

*e-mail*: gakannan@rediffmail.com

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**Abstract**

Groundnut occupies 3,38,300 ha in Tamil Nadu including 28,000 ha in Ariyalur District but its productivity is less (1.51 t $ha^{-1}$). To improve the productivity of Groundnut in the District, the Krish Vigyan Kendra (KVK) has implemented series of interventions *viz*., On-Farm Trials, Front Line Demonstrations, Cluster FLDs, trainings and method demonstrations from 2015-16 to 2019-20. The present study was undertaken to assess the impact of interventions of KVK in yield and income enhancement in groundnut cultivation. The study was conducted with the randomly selected 250 farmers at four blocks of Ariyalur District. The yield was recorded for all the years of the study both in control and demonstration plots. The parameters *viz*., frequency, mean, percentage, impact in adoption and yield increase were worked out. The adoption rate was the highest for the technologies *viz*., timely sowing and recommended spacing (96%), spray of crop boosters (86%), seed treatment (84%) and post harvest management (82%). The interventions of KVK had paved the way for increased productivity of Groundnut from 13.4 q $ha^{-1}$ during 2015-16 to 22.1 q $ha^{-1}$ during 2019-20 (65 percent increase). The adoption of improved varieties and technologies resulted in an additional income of Rs. 48,550.00 $ha^{-1}$. By the efforts of KVK and convergence activities of line department the improved practices were adopted in 13,250 ha. An additional cash inflow to District farmers realized was INR 64.33 crores $annum^{-1}$ and it benefitted 16,400 farmers and thus socio-economic empowerment of Groundnut growers of Ariyalur District of Tamil Nadu, India was improved.

## 1. Introduction

Groundnut (*Arachis hypogaea*) is commonly branded as poor man's nut also important food crop frequently used as edible oil and vegetable protein. It is sixth most important oilseed crop in the world. It is cultivated in 26.4 million ha with 37.1 million MT of total production throughout the world. It is habituated in the tropical, subtropical and warm temperate regions with average yield of 1,520 kg $ha^{-1}$. Groundnut crop can be cultivated in region were annual rainfall ranges from 500 to 1250 mm. It cannot withstand severe drought, water logging and frost. The major groundnut production states of India are Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra and contribute 86 percent of groundnut production in the country. In Tamil Nadu, Groundnut occupies 3,38,300 hectares with a production of 7,83,200 tonnes every year. The major groundnut producing districts of Tamil Nadu are Vellore, Cuddalore, Thiruvannamalai, Dharmapuri, Salem, Erode, Theni, Trichy, Madurai, Perambalur, Ariyalur, Pudukkottai and Kancheepuram.

Ariyalur district has been considered as productively potential region of groundnut as it is the main remunerative crop of farmers as it is being cultivated in both Kharif and Rabi seasons in an area of 28000 ha. However, there was a wide gap of upto 33 percent between the potential (2.4 t $ha^{-1}$) and the actual production realized by the farmers (1.51 t $ha^{-1}$) due to poor adoption of recommended package of practices by the farmers. Technological gap *i.e.,* poor knowledge about newly released crop production and protection technologies and its adoption in the farmers' fields is a major limiting factors in groundnut production during 2000 to 2010. Lack of awareness and poor adoption of scientific production technologies *viz.,* improved varieties, seed treatment with fungicide, application of biofertilizers, Integrated Pest and Disease management practices and post harvest management which were a key reason for low productivity of groundnut. The possible solutions to improve the production potential identified were adoption of recommended scientific production practices with improved and high yielding varieties. The Indian Council of Agricultural Research- Krishi Vigyan

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Kendra (ICAR-KVK), Ariyalur District functioning under the aegis of Indian Council of Agricultural Research, New Delhi has identified the technological gaps by field visits, surveys with the farmers during 2013-14 to 2014-15. Accordingly the KVK has contemplated series of programmes in terms of On-Farm Trials, Front Line Demonstrations (FLDs), Cluster Front line Demonstrations (FLDs), trainings and method demonstrations to improve the production potential of Groundnut by improving the adoption rate of advanced cultivation practices. The list of various interventions of KVK is listed in Table 1.

The objectives of the present study were to analyse the impact of the interventions of KVK over the period of five years in terms of productivity enhancement and improvement in socioeconomic condition of the Groundnut farmers at Ariyalur District of Tamil Nadu, India.

Table 1: Series of intervention of KVK, Ariyalur to improve the productivity of Groundnut during 2015-16 to 2019-20

| Sl. No. | Name of the intervention | Technologies assessed/ disseminated | No. of programmes | No. of participant farmers |
|---|---|---|---|---|
| 1 | On- Farm Trials (OFTs) | Assessment of high yielding varieties for irrigated and rainfed conditions; Assessment of drought mitigating and Integrated Pest and Disease Management (IPDM) technologies. | 4 | 24 |
| 2 | Front Line Demonstrations (FLDs) | Demonstrations on High Yielding varieties like GJG 9, Khadiri 7 and Dharani; Demonstration on Integrated crop management;<br>Demonstration of IPDM practices;<br>Demonstration on Mechanized sowing, weeding, harvesting and stripping;<br>Demonstration on preservation of Groundnut haulm. | 5 | 50 |
| 3 | Cluster Front Line Demonstrations (CFLDs) | Large scale Demonstrations on improved varieties and ICM practices. | 250 | 250 |
| 4 | Field Schools | Complete ICM practices in Groundnut-series of field classes throughout the cropping period. | 4 | 100 |
| 5 | Trainings | Soil test based fertilizer application;<br>ICM practices;<br>Organic cultivation of Groundnut;<br>Seed production. | 21 | 480 |
| 6 | Method demonstrations | Seed treatment with Rhizobium and Trichoderma;<br>Basal application of FYM and gypsum;<br>Chemical weed control;<br>Installation of IPM kits;<br>Spraying of crop boosters and drought mitigating chemicals and microbes;<br>Mechanized sowing, weeding, harvesting and pod stripping. | 18 | 373 |

**2. Materials and Methods**

The study was carried out during the five consecutive years from 2015-16 to 2019-2020 by the KVK Ariyalur District of Tamil Nadu. Though the Ariyalur comprising of six blocks, Groundnut is mainly cultivated in T. Palur, Jeyankondam, Andimadam and Sendurai blocks. The respondents of the study were randomly selected from 25 villages in the four blocks at the rate of ten farmers per villages comes to 250 respondents for the study. Selected farmers were the beneficiaries of KVK interventions and also they were trained to follow the package of practices for groundnut cultivation as recommended by the National Agricultural Research System (NARS) and need based inputs were also provided to the beneficiaries at large scale under National Mission on Oilseeds Production (NMOOP) as CFLDs. The farmers followed the full package of practices like soil testing, seed treatment with biofertilizer, soil test based fertilizer application, weed management, Integrated Pest Management (IPM) practices, mechanization *etc*. For comparison the farmers' practices (check) were followed by using existing varieties and their known practices. An area of 100 ha was covered with plot size 0.4 ha under cluster front line demonstration with active participation of 250 farmers in the study period. In demonstration plots, use of quality seeds of improved varieties (GJG9, Khadiri 7 and Dharani), Mechanized sowing and

timely weeding, need based pesticides application as well as balanced fertilizer were emphasized and comparison has been made with the existing practices. Visit of neighbouring farmers and the extension functionaries from line departments was organized at demonstration plots as field days to disseminate the practical utility of demonstrated technologies at large scale. The data were collected from demo plots throughout the study period.

The yield data of demonstration plots as well as control plots were collected immediately after harvesting to assess the impact of interventions on the yield of Groundnut (2015-16 to 2019-20). However, structured and pre-tested interview schedule was used to elicit the information from beneficiary farmers about adoption, varietal replacement and horizontal spread of technologies in adopted villages. The personal interview was conducted with the beneficiary farmers in the year of 2020-21 to assess the adoption of improved package of practices by the farmers. The secondary data like district area, average yield and number of groundnut growers were obtained from Department of Agriculture to conclude the study. The following formulae were used to assess the impact of interventions on the different parameters Groundnut.

Impact on adoption (% change) = (No. of adopters after demo. – No. of adopters before demo) / No. of adopters before demonstration×100

Impact on Yield = [(Yield of demonstration plot (ha) – Yield of control plot (ha)] / Yield of control plot (ha) × 100

The simple statistical tools like frequency, percentage, mean were adopted to interpret the data in a meaningful way (Samui *et al.,* 2000).

## 3. Results and Discussion

### *3.1 Impact of Interventions of KVK on Adoption of Groundnut Production Technologies*

Thirteen production technologies were identified as major contributing factors in production cost reduction and yield improvement of Groundnut. The change in number of adopters after the study period and its impact in terms of percent change are depicted in Table 2.

Table 2: Impact of interventions of KVK on adoption of groundnut production technologies (n=250)

| Sl. No. | Technology | No. of adopters | | Change in no. of adopters | Impact (% change) |
|---|---|---|---|---|---|
| | | Before Demo | After Demo | | |
| 1 | Use of improved varieties | 21 (8) | 122 (49) | 101 | 481 |
| 2 | Optimum seed rate | 36 (14) | 195 (78) | 159 | 442 |
| 3 | Seed treatment | 10 (4) | 210 (84) | 200 | 2000 |
| 4 | Timely sowing and optimum spacing | 60 (24) | 240 (96) | 180 | 300 |
| 5 | Soil test based Fertilizer application | 12 (5) | 180 (82) | 168 | 1400 |
| 6 | Proper Weed management practices | 48 (19) | 205 (72) | 157 | 327 |
| 7 | Irrigation scheduling using Soil Moisture Indicating tool (SMI) | 3 (1) | 85 (34) | 82 | 2733 |
| 8 | Adoption of mechanization in sowing, weeding, harvesting and stripping | 13 (5) | 176 (70) | 163 | 1254 |
| 9 | Earthing up operation 30 DAS and gypsum application | 80 (32) | 196 (78) | 116 | 145 |
| 10 | Foliar spraying of crop boosters on time | 26 (10) | 215 (86) | 189 | 727 |
| 11 | Adoption of IPM strategies | 38 (15) | 185 (74) | 147 | 387 |
| 12 | Timely disease management practices | 55 (22) | 172 (69) | 117 | 213 |
| 13 | Post harvest management practices | 35 (14) | 206 (82) | 171 | 489 |
| Overall adoption | | 33 (13) | 184 (74) | 150 | 838 |

Note: Figures in the parenthesis denotes percentage of adopters.

The data from Table 2 reveals that majority of the key technologies are being adopted by the famers after the interventions of KVK. Timely and season bound sowing plays an important role in obtaining higher productivity in any crop. Groundnut is sown during June-July as *kharif* crop and Nov-Dec as *Rabi* crop at Ariyalur District. Ninety six percent of the farmers took have the custom of sowing in the correct season. Likewise the recommended spacing of 30 cm × 15 cm was also adopted by 96 percent of the farmers to maintain optimum plant population. After the release of Groundnut Rich - a crop booster from Tamil Nadu Agricultural University, Coimbatore the farmers are well aware of its beneficial

effects in improving the groundnut yield to the tune of 15 to 20 percent besides increasing quality of the pods and hence 86 percent of the farmers adopted foliar spray of Groundnut Rich. Seed treatment with biofertilizers (Rhizophos) and bioproducts (*Trichoderma viride*) and/or Potassium Chloride for drought tolerance find the third place in the major technologies adopted as 84 percent of the respondents adopted the same. Post harvest management practices like proper drying, grading and storage were also adopted by 82 percent of the farmers. The least adoption (34%) was observed for irrigation scheduling using soil moisture indicating tool due to the farmers' tendency of 'more irrigation will give more yield'. The overall percentage of adopters of technologies was increased from 13 to 74 by the relentless efforts of KVK in disseminating the technologies among the farmers. The impact of interventions of KVK on adoption of groundnut production technologies by the farmers of Ariyalur District measured in term of percentage change and it was 838 percent in the study period of five years by considering the mean value arrived for 13 technologies.

*3.2 Impact of Interventions on Groundnut Productivity (yield ha$^{-1}$)*

Results of Cluster Front Line Demonstrations conducted during 2016-17 to 2019-20 in different villages of Ariyalur district indicated that the cultivation practices comprised under CFLD *viz.,* use of improved varieties, optimum seed rate, machine sowing, balanced application of fertilizers and control of pest and diseases through an integrated approach resulted in improved yield in Groundnut. It is evident from the results that under the demonstrated plots, the yield of groundnut was comparatively much higher than the local check from the year one of demonstrations and it was incremental year after year. The data of table 3 reveals that there was the consistent increase in productivity of Groundnut over the last five years as it recorded 16.4, 18.4, 21.1, 24.2 and 30.0 percent increased yield over the control plots. Whereas the yield was 42.7 percent increased in the demo plots as it recorded 15.6 q ha$^{-1}$ during 2015-16 and it rose upto 22.1 q ha$^{-1}$ during 2019-20. This could be due to the adoption of recommended varieties and package of practices as an impact of efforts put forth by the KVK in the last five years. Similar yield enhancement in different crops in cluster front line demonstrations were documented by Hiremath *et al.* (2007) in Onion; Mishra *et al.* (2009) in Potato; Kumar *et al.* (2010) in Bajra; Suryawanshi and Prakash (1993) in Oil seeds, Dhaka *et al.* (2010) in Maize, and Dhaka *et al.* (2015) in Coriander. The increase in percent of yield was ranged from 16.4 to 30.0 during the five years of study. The results were in conformity with the findings of Katare *et al.* (2011), Meena *et al.* (2012) and Tomar *et al.* (2003). The results also showed that there was an increasing trend of productivity in check plots also as it was 13.4, 14.7, 15.6, 16.5 and 17.0 q ha$^{-1}$ during the year 2015-16, 2016-17, 2017-18, 2018-19 and 2019-20 respectively. The increase in yield of check plots from 2015-16 to 2019-20 was 26.9 percent and it could be due to the technologies learnt and adopted by the farmers from other sources like newspapers, magazines, agriculture departments, listening of radio talks, NGO contacts *etc*.

Table 3: Impact of interventions of KVK, Ariyalur on productivity enhancement in Groundnut

| Year | Average yield (q ha$^{-1}$) | | Impact on Yield (% change) |
|---|---|---|---|
| | Check | Demonstration | |
| 2015 -16 | 13.4 | 15.6 | 16.4 |
| 2016-17 | 14.7 | 17.4 | 18.4 |
| 2017-18 | 15.6 | 18.9 | 21.1 |
| 2018-19 | 16.5 | 20.5 | 24.2 |
| 2019-20 | 17.0 | 22.1 | 30.0 |
| Average of five years | 15.4 | 18.9 | 22.7 |

*3.3 Impact of CFLDs on Horizontal Spread of Different Varieties of Groundnut*

In the present study, special emphasis were given to replace the old low yielding varieties with the newly released high yielding varieties thorough CFLDs after assessment through OFTs. Then the efforts were made to study the impact of CFLDs on the horizontal spread of different varieties to augment the productivity in groundnut crop. It was evident from the Figure 1 that CFLDs organized on groundnut crop helped to increase the area under improved varieties in adopted villages. There was a significant increase in area under the improved varieties from 190 ha during 2015-16 to 2750 ha during 2019-20 in the KVK cluster villages itself. The maximum area was expanded under GJG9, Kadhiri 7 and Dharani varieties of groundnut. By the convergence with the department of agriculture and the subsidies extended by the department to popularize these high yielding varieties, now it is being cultivated in 13,250 ha in the district. The reasons for higher adoption of these three

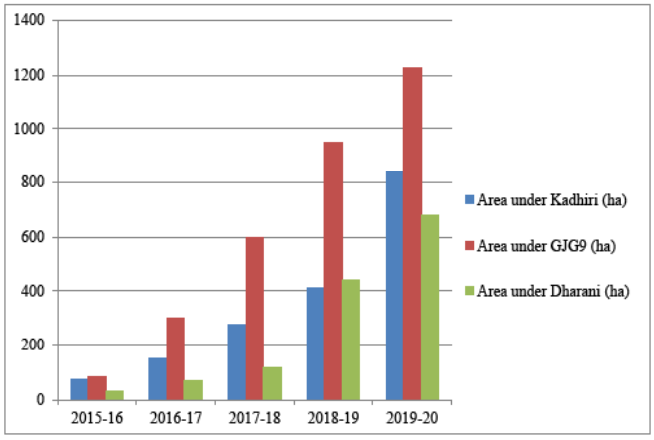


Figure 1: Impact of interventions of KVK on horizontal spread of improved varieties of Groundnut

varieties might be their agronomical attributes such as semi-spreading type, high yielding nature and tolerance to major pest, disease and drought. This data revealed that FLDs, CFLDs and trainings conducted by KVK made a significant impact on horizontal spread of improved varieties of Groundnut in the district.

*3.4 Impact of Interventions on Socio-Economic Condition of Farmers of Ariyalur District*

Groundnut as the predominant oilseed crop in the district, it is being cultivated in 28,000 ha by 33,200 farmers. By the series of interventions made by ICAR-KVK, Ariyalur District the farmers could save the cost in cultivation to the tune of INR 8,350.00 $ha^{-1}$ by mechanized sowing, chemical weed control, soil test based fertilizer application, use of IPM practices. By the improved cultivars and cultivation practices it could be possible to enhance the yield from 15.4 q $ha^{-1}$ to 22.1 q $ha^{-1}$ (43.5% increased yield) as the mean yield of study period over five years. The additional economic gains obtained by the additional yield per ha worked out to INR 40,200.00. The total net income increase per ha was Rs. 48,550.00. Now the improved practices disseminated by the KVK, Ariyalur is being adopted in 13,250 ha by 16,400 farmers. Hence the additional net cash inflow to the District is INR 64.33 crores during the year 2019-20 itself. An individual farmer could reap an additional income of Rs. 39,225 every year by the Groundnut cultivation. From the perusal of the above data it is evident that the technological and economical status of farmers enhanced and thereby their social status elevated. These results are in line with the findings of Naidu *et al.* (2019), as they also reported the similar socio-economic improvement of sericulture farmers at Madakasira mandal of Andhra Pradesh by cluster promotion programmes.

## 4. Conclusion

The Krishi Vigyan Kendra functioning under the financial support of Indian Council of Agricultural Research plays a major role in improving the livelihood of all categories of farmers across the country. The present study on impact analysis of interventions of KVK, Ariyalur revealed that it made the commendable difference in the productivity of Groundnut and additional net income to the Ground nut farmers by its series of interventions like OFTs, FLDs, CFLDs and trainings in the last five years period. The National Mission on Oilseeds Promotion played the crucial role on large scale demonstrations of Ground nut improved varieties and technologies and it paved the way for increased productivity from 1.56 t $ha^{-1}$ to 2.21 t $ha^{-1}$ in the five years. By the enhanced income from groundnut cultivation the socio-economic status of Groundnut farmers in the District also improved besides acquiring technological backup.

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