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Extent of adoption of ANGRAU technologies in Bengal gram crop in YSR district of Andhra Pradesh, India

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ABSTRACT

Bengalgram is the major pulse crop of YSR District grown exclusively during *Rabi* season covering 1,05,462 hectares. ANGRAU was established during 1964 and developed different agricultural technologies in various crops. But the adoption of those technologies was not documented officially. The present study was conducted during 2019-20 in YSR Kadapa district with 60 number of respondents selected from 12 number of villages and 6 number of mandals from YSR Kadapa district to study the extent of adoption of ANGRAU technologies and the reasons for non adoption of the recommended technologies in Bengalgram crop. The major findings of the study indicate that majority of the farmers (96.67 %) adopted Inter cultivation twice at 20 and 30 DAS, followed by 90.00% adopted Sowing Time-October-November, followed by Fertilisers-20 Kg N, 50Kg P₂O₅, 40 Kg sulphur and 50Kg/ha, Zn as basal dose (86.67%), followed by Curative spray either Monocrotophos @ 1.6 ml or Acephate @ 1.0 g or Quinalphos @ 2.0 ml or Thio dicarb @ 1 g/l (80%). The reasons expressed by the farmers (80.00%) for non adoption of spacing 30x10 cm was due to high seed rate, followed by 75.00 per cent of farmers expressed the reason for non adoption of Neem Seed Kernel Extract 5 % (NSKE 5%) as it is laborious.

Key words : ANGRAU technologies, Bengal gram

Introduction

Chickpea is the world's third most important food legume with 96% cultivation in the developing countries. It is the major pulse in India which contributed about 35 percent of area of pulse production. In India, chickpea (commonly known as gram or Bengal gram) remarkably predominates among other pulse crops in terms of both area and production. Unlike other pulses which are primarily used as 'dal', the chickpea has multiple uses (used as besan for preparation of sweets, consumed as whole seed and roasted for eating and recently used as

health food. It is a protein-rich diet especially to the poor in developing countries, where people are vegetarians or cannot afford animal protein and helps in enhancing the soil quality for subsequent cereal crop cultivation (Rajbhar *et al.*, 2018). India contributes 70 per cent of total world Bengal gram production of 116.2 lakh tonnes cultivated under 112 lakh hectares with productivity of 1036 kg/hectare in 2020-21 (agricoop.nic.in). India is the largest producer of world gram production followed by Australia, Myanmar and Ethiopia (FAO STAT, 2019). India is the largest producer of chickpea but still imports chickpea from other countries and ranked first in

(¹ Programme Coordinator)

area and production of chickpea in the world, followed by Pakistan, Australia and Iran. The highest productivity of chickpea (6120 kg/ha) is observed in Israel followed by Yemen, Canada and Egypt and it is second most important pulse growing country worldwide in terms of area under cultivation but ranks third in production (Nidhi Sharma *et al.*, 2020). In India, Bengal gram takes first position in total pulse production followed by Black gram. Andhra Pradesh produces 5.66 lakh tonnes in an area of 4.65 lakh hectares with 1218 kg/hectare productivity in 2020-21 (Third Advance Estimates, 2020-21, DES-AP). Bengalgram is the major pulse crop of YSR District grown exclusively during Rabi season covering 1,05,462 hectares. ANGRAU was established during 1964 and developed different agricultural technologies in various crops. But the adoption of those technologies were not documented officially. Documentation and studying the extent of adoption of ANGRAU technologies is very much useful to the ANGRAU officials to take the policy decisions. Hence this study focussed on adoption of ANGRAU technologies in Bengalgram crop.

Methodology

The study was conducted during 2019-20 in YSR Kadapa district. Chintakomma Dinne, Vallur, Pendlimarri, Khajipet, Proddatur, Kamalapuram mandals were selected purposively as they have considerable area under Bengalgram cultivation in the district. Papasaheb peta, Pabbapuram villages from Chintakomma Dinne mandal, Lingayapalli, D. Kothapalli villages from Vallur Mandal, Pata sangati palli, Mammusiddupalli villages from Pendlimarri Mandal, Tudumula dinne, Yeturu villages from Khajipet Mandal, Peddasettipalli, Somulavaripalli villages from Proddatur Mandal, Kamalapuram, Kogatam villages from Kamalapuram Mandal were selected purposively as they are the major Bengalgram growing villages. From each of the selected villages 6 no. of Bengal gram farmers were selected by simple random sampling. Ex post Research design was followed for the study. Data was collected from the identified beneficiaries using a structured interview schedule developed for the study. The Statistical tools frequency, percentage, mean were used for analysis of the data.

Results and Discussion

From the Table 1 it was observed that the majority of the farmers were aware about the sowing Time (96.67 %), inter cultivation twice at 20 and 30 DAS (96.67 %), varieties (95.00 %), application of recommended fertilizers (90.0 %), application of *Trichoderma* enriched FYM at the time of sowing (90.00%), crop rotation with sorghum, bajra, setaria or maize (86.67%), two light irrigations at branching and pod filling stage (85.0%), Curative (85.0%) and Prophylactic spray (81.67 %) for the control of *Spodoptera Exigua*. As per the data from above table revealed that 83.33 percent of the farmers had aware about the Seed treatment for the control of wilt and dry root rot.

Regarding control of helioverpa, percent of the farmers had higher awareness about using neem solution for repelling the insect and chemical sprayings with 81.67 & 80.00 percentage respectively. Likewise, 60.00, 63.33 and 65.00 percent of the farmers had awareness on following of strip cropping of Bengalgram with coriander (8:2 or 16:4), use of Bird perches (50/ha) and transplant of 50-100 mari-indoo seedlings all round the plot respectively.

71.67 percent farmers had awareness on weed control by spraying of Pendimethalin immediately after sowing. On Seed treatment with *Trichoderma* and Vita Vaxpower or Tebuconazole only 65.00 percent of the farmers had awareness about this technology. Among all technologies of bengalgram, 58.33 percent of the farmers had least awareness on Seed rate and Spacing.

The data pertaining to the practice wise awareness and adoption of improved technologies of bengalgram cultivation is presented in the Table 1 revealed that farmers possessed high adoption (96.67%) about Inter cultivation twice at 20 and 30 DAS. These results are in conformity with findings of Brunda *et al.* (2019) who reported that higher proportion of (53.84%) low adopters adopted intercultivation. The highest per cent of adoption was observed in both seed rate (90.32%) and intercultivation (90.32%) in case of high adopter categories. Whereas, extent of adoption was highest in intercultivation (88.00%) in case of medium adopter categories.

In case of sowing time (October –November) majority 90.00 per cent of farmers adopted. It was also evident from the studies of Dhayal and Mehta

(2015) reported that the majority of farmers who adopted recommended practices were found to be high in case of time of sowing. Nidhi Sharma *et al.* (2020) observed that Regarding sowing time 97.00 per cent respondents had high level of adoption followed by 92.33 per cent had medium level of adoption and 33.33 per cent had low level of adoption.

Fertilizer is one of the important inputs to increase productivity. In case of fertilizers 86.67 per cent of the farmers applied 20 kg/ha Nitrogen, 50 kg P₂O₅/ha, 40kg S/ha and 50 kg ZnSO₄/ha. The practices which were adopted by majority of farmers were application of Nitrogen (77.67 per cent), application of Phosphorus (51.78 per cent) Anonymous. (2007).

The important production technologies on which they were having more than fifty percent technological gap were Seed rate (80.00 %), Spacing (80.00 %) and irrigations at branching and pod filling stage (60.00%). More than half percentage of the farmers followed recommended varieties (58.33 %) seed treatment (53.33%) and application of herbicides (55.00 %).

In case of IPM, 75.0 % of the farmers followed recommended insecticides, bird perches used 53.33 % of the farmers, 31.67 % of the farmers followed transplanting of marigold seedlings all around the plot, 30.00 percent of the farmers followed strip cropping with coriander (8:2 or 16:4) and 25.0 percent of the farmers used NSKE 5% solution for insect repelling for the control of helicoverpa. Prophylactic spray with neemoil 3000 ppm @2.0 ml/1 of water at 15 DAS followed by the 26.67 percent of the farmers and 80.0 percent of the farmers followed curative spray either Monocrotophos@1.6 ml or Acepahte @1.0 g/lit of water for the control of Spodoptera. Farmers had (48.33%) knowledge level of disease and (59.16%) knowledge of control measure practices, while (53.33%) knowledge of insect pest and (61.66%) of knowledge their control measure practices (Shanikumar singh *et al.*, 2017). The data in respect to IPM shows that near about half

Table 1. Adoption levels of ANGRAU technologies in Bengalgram

S. No.	ANGRAU Technology	Aware		Adopted	
		f	%	f	%
1	Varieties Desi-Nandyal Gram 49, Nandyala Sanaga-1 Kabuli-Nandyal Gram 119	57	95.00	35	58.33
2	Sowing Time-October-November months	58	96.67	54	90.00
3	Seed rate-30-35 Kilos(JG-11, Nandyal Gram 49, Nandyal Sanaga-1) 45-50 Kilos (Vihar, Dheera, NBeG 119, KAK 2)	35	58.33	12	20.00
4	Spacing-30x10 cms	35	58.33	12	20.00
5	Seed treatment with <i>Trichoderma</i> 8 g/Kg and Vita Vaxpower 1.5 g or Tebuconazole 1.5 g/Kg seed	39	65.00	32	53.33
6	Fertilisers-20 Kg N, 50Kg P2O5, 40 Kg Sulphur and 50Kg/ha, Zn as basal dose.	54	90.00	52	86.67
7	Inter cultivation twice at 20 and 30 DAS	58	96.67	58	96.67
8	For weed control spray pendimethalin 2.5 to 3.5 l/ha immediately after sowing	43	71.67	33	55.00
9	Two light irrigations at branching and pod filling stage	51	85.00	24	40.00
10	Control of Helicoverpa: Following of strip cropping of Bengalgram with coriander (8:2 or 16:4)	36	60.00	18	30.00
	Use of Bird perches (50/ha)	38	63.33	32	53.33
	Transplant of 50-100 marigold seedlings all round the plot	39	65.00	19	31.67
	Use of neem formulation for insect repelling (NSKE 5%) soon after the pest occurrence	49	81.67	15	25.00
	Spray spinosad @0.35 ml or Rynaxypyr @ 0.3 ml/1 or Indoxacarb @ 1 ml/1lit	48	80.00	45	75.00
11	Spodoptera Exigua: Prophylactic spray of neem oil 3000 ppm @ 5 ml/1 at 15 DAS	49	81.67	16	26.67
	Curative spray either Monocrotophos @ 1.6 ml or Acephate @ 1.0 g or Quinalphos @ 2.0 ml or Thiodicarb @ 1 g/1	51	85.00	48	80.00
12	Wilt & Dry root rot: Seed treatment with Vitavaxpower 1.5 g or Tebuconazole 1.5 g/Kg seed.	50	83.33	45	75.00
	Application of <i>Trichoderma</i> enriched FYM at the time of sowing (80 Kg FYM + 20 Kg Neemcake+2-3 Kg <i>Trichoderma</i>).	54	90.00	31	51.67
	Follow crop rotation with Sorghum, Bajra, Seteria or Maize.	52	86.67	28	46.67

(48.75 per cent) of the respondents spraying Chlorantraniliprole for control of pod borer. Near about one fifth (17.50 per cent) of the respondents spraying 5% NSKE solution to control pod borer. Very meager (3.75 per cent) of the respondents use HaNPV, bird stakes (3.75 per cent) and Pheromone traps (3.75 per cent) for biological control of pod borer. No one respondents sowing 200 gm jowar for biological control of pod borer (Ahire *et al.*, 2021)

Under disease control 75.0 percent of the farmers followed the seed treatment, application of *Trichoderma* and crop rotation followed by 51.67 & 46.67 percent of the farmers respectively.

Constraints in adoption of new technology never end. However they can be minimized. The respondents were requested to express the constraints faced by them in adoption of improved cultivation practices of gram. The data presented found that

major constraints perceived by respondents were, adoption of recommended spacing (80.00 %) due to higher seed rate, followed by application of NSKE @ 5.0 %, spraying of Neem oil 3000 ppm @ 5.0 ml/l at 15 DAS (75.00 %) as it was laborious, more man power required for transplanting of 50-100 marigold seedlings all round the plot as a result 68.33 per cent respondents not adopted this technology, deep sowing gives less germination because of this 56.67 per cent not adopted strip cropping of Bengalgram with coriander, as a consequence of delay for main crop in case of delay in rainfall 53.33 per cent farmers was not followed crop rotation with Sorghum, Bajra, Seteria or Maize.

48.33 per cent of the farmers not adopted application of *Trichoderma viride* due to rain fed agriculture. Due to suspicious results by the use of bird perches 46.67 per cent of the farmers were not used this tech-

Table 2. Reasons for non adoption of recommended technologies in Bengalgram crop

S.N	ANGRAU Technology	Reason for non adoption	f	%
1	Varieties	Subsidy for JG-11 from Dept. of Agriculture	20	33.33
		No awareness	5	8.33
2	Sowing Time	—	6	10
3	Seed rate	Damage of seedlings	28	46.67
		Possible to increase yield	12	20
		More seed usage habit	8	13.33
4	Spacing-30x10 cms	High seed rate	48	80
5	Seed treatment	No awareness	18	30
		Hexaconazole	10	16.67
6	Fertilisers	With the expectation of getting more yields	8	13.33
7	Inter cultivation	—	2	3.33
8	weed control	Manual weeding	15	25
		Damage to plants	8	13.33
		No weeds	4	6.67
9	Irrigations	Pure rain fed	26	43.33
10	Strip cropping of Bengalgram with coriander	Deep sowing gives less germination	34	56.67
		Lack of awareness	8	13.33
11	Use of Bird perches (50/ha)	Suspect of results	28	46.67
12	Transplant 50-100 marigold seedlings all round the plot	More manpower required	41	68.33
13	NSKE 5%	Laborious	45	75
14	Spinosad, Rynaxypyr , Indoxacarb	—	15	25
15	Neem oil 3000 ppm @ 5 ml/l at 15 DAS	Suspect of results	44	73.33
16	Monocrotophos @ 1.6 ml or Acephate @ 1.0 g or Quinolphos @ 2.0 ml or Thidicarb @ 1 g/l	—	12	20
17	Seed treatment with Vitavaxpower 1.5 g or Tebuconazole 1.5 g/Kg seed	No awareness	15	25
18	Application of <i>Trichoderma viride</i> at the time of sowing	Due to rain fed Agriculture	29	48.33
19	Crop rotation with Sorghum, Bajra, Seteria or Maize	Delay for main crop in case of delay in rainfall	32	53.33

nology. In case of seed rate 46.67 per cent of the farmers not adopted recommended seed rate as damage of seedling may occur because of the reason farmers adopted more seed rate, 20.0 per cent of the farmers told that by using more seed rate there may be possibility of increase in yield and 13.33 per cent of the farmers having habit of using higher seed rate than recommended.

As farmers growing chickpea completely on rainfed 43.33 percent of the farmers not followed irrigation at branching and pod filling stage. Seed treatment with Vitavaxpower 1.5 g or Tebuconazole 1.5 g/Kg seed for the control of Wilt and Dry root rot 25.00 per cent of the farmers had no awareness. 30.00 & 16.67 per cent of the farmers had no awareness and used hexaconazole for the seed treatment and not followed recommended seed treatment with *Trichoderma viride* 8 g/kg and Vitavaxpower 1.5 g or Tebuconazole 1.5 g/kg seed. With respect to weed control manual weeding done by 25.00 %, 13.33 per cent of the farmers not applied herbicide as they afraid of as it may cause damage to the crop and 6.67 per cent of the farmers expressed that their crop is free from weeds.

Conclusion

Farmers possessed high adoption on production technologies like, inter cultivation twice at 20 and 30 DAS, sowing time, recommended dose of fertilizers. The important production technologies on which they were having more than fifty percent technological gap were Seed rate, Spacing and irrigation. In case of IPM, most of the farmers followed recommended insecticides, using bird perches, transplanting of marigold seedlings all around the plot, strip cropping with coriander and NSKE 5% solution for insect repelling for the control of helicoverpa. Most of the farmers followed the seed treatment, application of *Trichoderma Viride* and crop rotation followed for disease control. The data presented found that major constraints perceived by respondents were, adoption of recommended spacing, application of NSKE, spraying of Neem oil, transplanting of marigold seedlings, strip cropping of Bengalgram with coriander, crop rotation with Sorghum, Bajra, Seteria or Maize. Most of the improved agricultural technologies developed by ANGRAU in chickpea cultivation are popular in the farming community. This could be due to the multiplicity of the transfer

of technology mechanisms followed by the KVK and DAATTC scientists. But many of the farmers are not aware of few improved agricultural technologies such as seed rate, spacing, some of the integrated pest management practices. Thus a series of awareness programmes, field visits, field days, other interaction meetings should be organized for better reach of scientific Package of practices on chickpea. Extension methods like training and demonstration were found impactful in terms of enhancing level of adoption of scientific package of practices of chickpea. Thus these extension methods need to be popularized and used efficiently by extension organizations to obtain maximum productivity.

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