Original Research Article

Adoption of Recommended Production Technologies ofSoybean Among the Farmers of Dharwad District of Karnataka, India

ABSTRACT

The study was conducted in Dharwad, Hubli and Kalaghatagi taluks of Dharwad district of Karnataka state during 2020-21 with a sample size of 150 soybean farmers. The “Ex-post facto” research design was employed for the study. The data was elicited through personal interview method. There was about 8 per cent of land cultivated with DSb-21 during 2017-18 in Dharwad district, gradually it has reduced to 2 per cent during 2020-2021. About 64.00 per cent had medium level of adoption about recommended cultivation practices of soybean, whereas, only 9.33 and 26.66 per cent of the soybean farmers belonged to high and low level of adoption category, respectively. The results revealed that the farmers had complete knowledge and adoption of recommended variety (Dsb-21), while 86.67 per cent of the farmers adopted recommended sowing time in the kharif season. Further, 85.33 per cent of the farmers adopted spacing as recommended and 80.67 per cent of them have adopted recommended seed rate of 25kg/acre. The study concluded that 39.33 per cent of the farmers follow seed treatment and only 27.33 per cent of them adopted seed inoculation with rhizobium culture. Further 80.66 per cent of the farmers adopted application of FYM as recommended but only 37.33 per cent of the farmers have adopted chemical fertilizer application as recommended. With respect to weedicide application 41.33 per cent of the farmers adopted and cent per cent of the farmers had adopted intercultural operation (hoeing). About 48.00 per cent of the farmers adopted pest and disease management as recommended.

Key words: Adoption rate, Production technology, Soybean production, Socio-Economic profile.

1. INTRODUCTION

India has showed a tremendous growth after independence in agricultural sector. Green Revolution witnessed by our country in last sixties is a landmark which has not only resulted in self-sufficiency in food grains but also surplus export of the produce to other countries. In addition, “Yellow Revolution” which is the resultant of enhanced pace in development of Indian agriculture for the last two and a half decades which has contributed remarkably due to newly introduced crops like soybean and sunflower (Joshi, 2003).

At present area under soybean and its production is steadily increasing and has gained momentum in oil front. Soybean crop has a potential to fulfill the requirement and to act as substitute to different oilseeds and pulses to overcome shortage of edible oil and protein rich food. Hence soybean has become an important oilseed crop in the country by occupying first place in world edible oil production. In India, about 80 per cent edible oil is obtained from groundnut, rapeseed and mustard. However, the non-traditional seeds namely soybean and sunflower are emerging as a new source of oil, having vast yield potentials.

The Indian Council of Agricultural Research (ICAR) provided financial and infrastructural

support and launched an All India Co-ordinated Research Project on Soybean in 1967. The success of the project has been phenomenal. From a negligible area in 1968, soybean is now being cultivated in millons of hectares has gave birth to a chain of soya-basedindustries. Besides soybean having high yield potential (30-35qtl/ha), it provides cholesterol free oil (20%) and quality protein (40%). It will support improving agriculture and develop industries as it is versatile crop with innumerable possibilities. The oil extracted are purely edible and rich in Lycine (4-6%). It has became an important crop in India because there is a short in supply of proteins in the country with large vegetarian population. To supplement the quality and high protein content with high yield potential the crop like soybean is emmensible.

The world has projected to produce 385.5 million metric tons of soybeans, up to 22.6 million metric tons more from 2019-20. From 2015-16 to 2018-2019, the United States was the leading global producer of soybean with the production volume of 120 million metric tons in 2018/2019. Presently, Brazil overtook the United states as the leading soybean producing country with a production volume of some 126 million metric tons followed by United states and Argentina and China. India ranked fifth both in terms of area (113.99 lakh hectare) and production (135.05 lakh tonnes) in the world during 2019-2020 (Anonymous, 2019).

Major soybean growing states in terms of production are Maharashtra (4.54 million tons (mt)), Madhya Pradesh (4.17mt), Rajasthan (0.86mt), Karnataka(0.3mt), Andra Pradesh (0.16mt), Gujarat (0.14mt), Chhattisgarh (0.06mt) and others (0.12mt). The area under the crop in Karnataka state during 2019-20 was 3.30 lakh hectares with the production of 2.57 lakh tonnes and productivity of779 kg/ha. Soybean is widely grown in Bidar, Belgaum, Dharwad, Gulburga and Haveri districts of Northern Karnataka. Due to its characteristics such as short duration, high yielding potential protein and oil content, good fodder and building soil fertility by fixing atmospheric nitrogen in the soil, it is very familiar to the farming community.

Adoption of production technologies as recommended for the crop in larger scale is the essential feature of agricultural development. However, some farmers will adopt all the recommended production technologies but the others may not. The personal, social and economic aspects of the farmer's act as factors which influences in their knowledge and adoption process. It was felt that information about the particular variety, production practices, extent of awareness, knowledge, adoption and technological gap in soybean crop in relation to personal characteristics and their impact on income and productivity is very essential and important aspect today. Development of several production technologies for soybean crop has been undertaken by UAS Dharwad, through research centers funded by Indian Council of Agricultural Research for increasing the productivity and income of farmers. In this direction various improved varieties and crop management practices have been released. Soybean cultivar DSb-21 released in 2013 and notified in the year 2015 by UAS-D which is very popular in southern zone of India known as tolerant to pod shattering and rust resistant variety has been taken for the study.

Keeping this in view, the investigation was designed on adoption of soybean production technologies in Dharwad district of Karnataka state with the following specific objectives. To assess the profile characteristics of soybean growers and to measure the adoption of recommended production technologies among the farmers

2. METHODOLOGY

2.1 Selection of study area and respondents

The study was conducted in Dharwad district of North Karnataka in the year 2020-21.Based on the list of farmers provided by National Seed Corporation, Karnataka Oilseed Federation, Raita Samparka Kendra, Department of Agriculture, KVK and Seed unit UAS Dharwad, 150 farmers growing DSb-21 variety of soybean are selected randomly from three taluks (Dharwad, Hubli and Kalaghatagi) of Dharwad district.

2.2 Adoption of recommended cultivation practices

Adoption is a decision to make full use of an innovation as the best course of action available. It refers to the adoption of the recommended production technologies by the soybean growers as mentioned and recommended by the University of Agricultural Sciences (UAS), Dharwad package of practices book.

All the important operations under soybean cultivation were listed. A total number of 14 common recommended practices were selected based on the suggestions of the specialists. The proper answers for these questions were obtained with the help of package of practice book and soybean specialists of the University of Agricultural sciences, Dharwad was quantified by scoring 2 for adoption and 0 for non-adoption.

Based on the responses obtained, the adoption level was quantified by using frequency and percentage.

Category	Score
Low	Less than (Mean - 0.425 SD)
Medium	Between (Mean ± 0.425 SD)
High	More than (Mean + 0.425 SD)

3. RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been summarized under following heads:

3.1 Profile characteristics of soybean farmers

The data represented in Table-1 gives a detailed view of personal characteristics of soybean

farmers.

3.1.1 Age

The results presented in Table 1 revealed that majority of the farmers (62.66%) belonged to middle age group (36-55 years) followed by young age with 28.00 per cent (18- 35 years) and so on.

when compared to young and old farmers, farmers who belonged to the middle age have more physical vigour, enthusiastic, better farming experience and work more efficiently.The results are in the line with the findings of Makashree (2014) and Sikarwar (2019).

3.1.2 Education

The results from the Table 1 showed that majority of the respondents had high school education (30.00%) while 24.00 per cent were illiterate and so on.

Even today the rural people expect their children to assist them in farm and household activities and do not prefer to send their children for higher education the reason may be that they are still traditional bound or inaccessibility of educational centers. This have prevented the parents from providing higher education to their children. The rural social environment was the major cause for such trend. The results are in the line with the findings of Kumar (2009), Makashree (2014) and Jamanal (2016).

3.1.3 Farming experience

Farming experience depends on age and education of the farmer. It is concluded in the table 1 that majority (62.66%) of the farmers belonged to middle age and about 30 percent of the farmers had education up to high school. Since agriculture being main occupation of the soybean growing farmers in the district, they might have started practicing agriculture as a main occupation of their formal education. Hence, more number of respondents had medium to high farming experience. The results have the support with the findings of Ramhari (2014) and Babubhai (2018).

3.1.4 Land holding

The data from the Table-1 revealed that 42.66 per cent of the farmers belonged to medium land holding category (10.01-25 acres) and so on.

The reason may be the farmers always like to possess more and more land being agriculture as a main occupation and their way of life. The other possible reason is due to sub division and fragmentation of land holdings from generation to generation and may be due to increase in family members might have led to small and medium land holdings. The above findings are in consonance with the findings of Dohare (2014) and Ramachari *et al. (*2016).

3.1.5 Area under soybean cultivation

It is evident from the Table-1 concluded that, majority (93.33%) of the farmers possessed small area under soybean crop, followed by medium (4.66%) and large (2.00%) area respectively.

Majority of the farmers fall under small area under the cultivation of particular crop. The reason may be due to the subdivision and fragmentation of land holding to individual ratio is coming

less. Every grower will strive to get maximum returns from the crop for his investment irrespective of area. This above mentioned results are in the line with the findings of Raghuwanshi (2010). Their study showed that more number of the farmers had 2.5 to 5 ha of land under cultivation of particular crop.

Table 1. Profile characteristics of soybean farmers

(**n=150)**

Sl. No	Category	Frequency	Percentage
1.	**Age**		
	Young (18-35 years)	42	28.00
	Middle (36-55 years)	95	62.66
	Old (above 55 years)	12	8.00
2.	**Education**		
	Illiterate	36	24.00
	Primary school (1^{st} to 4^{th} std)	30	20.00
	Middle school (5^{th} to 7^{th} std)	22	14.60
	High school (8^{th} to 10^{th} std)	45	30.00
	PUC (11^{th} to 12^{th} std)	11	7.30
	Graduation (degree) and above	06	4.00
3.	**Farming experience**		
	Low (1-11 years)	36	24.00
	Medium (12-24 years)	59	39.33
	High (25-37 years)	55	36.66
4.	**Land holding**		
	Marginal farmer (up to 2.50 acres)	09	12.00
	Small farmer (2.51 to 5.00 acres)	23	15.33
	Semi-medium farmer (5.01 to 10.00 acres)	78	25.33
	Medium farmer (10.01 to 25.00 acres)	33	42.66
	Big farmer (above 25.00 acres)	00	4.66
5.	**Area under soybean cultivation**		
	Small (1 – 9 acres)	140	93.33
	Medium (10 – 18 acres)	07	4.66
	Large (19 – 28 acres)	03	2.00
6.	**Extension participation**		
	Low (<2.40)	45	30.00
	Medium (2.40-4.13)	68	45.33
	High (>4.13)	37	24.66
	Mean=3.27 SD=2.04		
7.	**Mass media use**		
	Low (<5.91)	23	15.33
	Medium (5.91-9.29)	95	63.33
	High (>9.29)	26	17.53
	Mean=7.60 SD=3.98		
8.	**Innovativeness**		

	Low (<15.75)	25	16.66
	Medium (15.75-18.29)	76	50.66
	High (>18.29)	49	32.66
	Mean=17.02 SD=3.01		
9.	**Cropping intensity**		
	Low (<177.82)	28	18.66
	Medium (177.82-194.28)	48	32.00
	High (>194.28)	74	49.33
	Mean=186.50 SD=19.35		
10.	**Scientific orientation**		
	Low (<20.39)	34	22.66
	Medium (20.39-24.61)	86	57.33
	High (>24.61)	30	20.00
	Mean=186.50 SD=19.35		

3.1.6 Cropping system

The cropping system followed by the farmers in the district in Table-2 revealed that no farmer practiced mono cropping system and about 65.33 per cent of the farmers followed double cropping system. It was shown that 36 per cent of the farmers practiced multiple cropping system.

Growing several crops in same land and in the same year to generate more than one crop per year has gained interest in recent years as a method to intensify production where farmers are in need to expand their farm largely due to improved management practices. Double cropping with maize/wheat followed by soybeans has been a common and profitable option for farmers from years because of double yield as well as full-season soybeans. Although, this is far from a new production practice; some farmers have been employing double cropping since the 1970s. Most of the farmers with rainfed land holding and no proper irrigation facilities prefer double cropping. Thus output per unit area increases with manifold returns to the growers. The findings are in conformity with Somanatti (2015).

Table 2: Distribution of farmers on cropping system

(n=150)

Category	Cropping sequence	Sequence followed	f	%
Mono cropping	-	-	-	-
Double cropping	Soybean-Maize	30	98	65.33
	Soybean/Maize-Chickpea/Wheat	26		
	Soybean-Sorghum	22		
	Others	20		
Multiple cropping	Soybean-Wheat-Maize	20	54	36.00
	Soybean-Sorghum-Vegetables	16		
	Paddy-Soybean-Maize	10		
	Others	08		

3.1.7 Extension participation

An insight into the Table-1 indicated that 45.33 per cent of the soybean growers belonged to

medium extension participation and so on.

It is clear from the Table-1 that various responses obtained from the farmers regarding extension participation. The reason for low participation may be due to absence of the farmers due to lack of time or to attend other work which is more important than attending extension activities. The other reason may be due to lack of awareness about the activity conducted in the area. Due to usefulness, popularity, vicinity and regularity of the information, majority of the farmers are under medium extension participation. The results are in the line with the findings of Gopal (2011) and Babubhai (2018).

3.1.8 Mass media exposure

From the Table-1 it was observed that more than half (63.33%) of the soybeangrowers falls under medium mass media usage category and so on.

Since, newspaper is one of the cheapest mass communication media and majority of the farmers are literates in the study area resulted in the positive result. The results are in agreement with the findings of (Choudhary *et al.* 2019; Sikarwar,2019).

3.1.9 Innovativeness

The Table-1 clearly revealed that half of the soybean farmers (50.66%) belonged to medium level of innovativeness. The farmers are influenced to know more and more about the recently developed technologies in order to earn more. Majority of the farmers are middle aged, educated up to high school, medium land holding (10-20 acres) high income (Rs 51000/year) are the possible reasons and the factors behind the above mentioned findings and hence majority belonged to medium innovativeness category. The findings here are in conformity with the results reported by Ashok (2015) and Jamanal (2016).

3.1.10 Cropping intensity

The results presented in the Table-1 revealed that 49.33 per cent of the soybean farmers had high cropping intensity (>194.28) and so on.

The reason behind the result were the crop will get good irrigation facility because there is a well distributed rainfall of 539.70 mm to 1037.20 mm under rainfed condition from April – May to September – October. The crop can draw nutrient of definite proportion from different strata through cultivation of crops in kharif and rabi season and take up crop rotation by suitable arrangement of successive crop. These might be the reasons to get majority of the farmers in high cropping intensity group. The above findings are contradictory to the findings of Kanavi (2000) and Nataraj (2002

3.1.11 Scientific Orientation

It is revealed from the Table-1 that more than half (57.33%) of the soybean growers belonged to medium level of scientific orientation, followed by low (22.66%) and high (20.00%) level

of scientific orientation.

The scientific orientation of the farmer depends upon the personal, psychological, socio-economic characteristics. The farmers with more farming experience, more land holding with medium education have exhibited medium and low scientific orientation. This may be the reason behind the results mentioned above.

The findings are in accordance with the findings of Tidke *et al.* (2012) and Jamanal (2016).

3.1.12 Livestock possession

The Table-3 showed the distribution of the soybean growers based on their livestock possession. It is clear from the table that, about 62 per cent of the farmers had less than two buffaloes while 6 per cent of them had 3-4 buffaloes, 3 per cent of them possess 5-6 buffaloes, about 1 per cent of the farmers had more than 7 and less than 10 buffaloes in number respectively. calves respectively.

Further with respect to cow, about 32 per cent of them possess less than two calves in their home, while, 8 per cent of them had between 3 to 4 number of calves, and none of them possess more than 5 calves respectively.

The table revealed that, about 55 per cent of the farmers possess less than two bullock pair

in their home, while none of them had more than two in number. Further in case of sheepor goat possession by the farmers, 46 per cent of the farmers had less than 2 in number, 2 per cent of them had 3-4 in number, 8 per cent of them had 5-6 in number, 5 per cent of them had 7-8 number sheep or goat and about 7 per cent of them had 9-10 number of animalsrespectively.

The reasons for the above mentioned results may be, Buffalo is also considered friendof farmer family not only for drought power and fertilizer but also to take full advantage of feed resources, free time and subsidiary labor etc. buffalo farming is good for many types of milk, meat and skin products but mostly the buffalo milk is used for producing dairy products. The milk is of very good quality containing high amount of fat and protein.

Cattle rearing have been for many people in India for a long time. A family can live comfortably and can earn money by selling milk, dung, curd and ghee etc. Bullock is used in farming process like ploughing, harrowing water lifting by Persian wheel and for transportation. Farmers take pride in pair off bullock and they do not afford to buy farm machinery even today.

With limited requirement of labor and modern infrastructure facility sheep/goat rearingcan be done compared to other livestock. They are the economical converters of grass into meat and wool, the foundation stocks are relatively cheap and flock can be multiplied rapidly.

Livestock possession is an important component in dry land farming system. With very low investments can be made in a profitable venture for small, marginal farmers and landless laborers.

Similar findings are reported by Roy *et al.* (2013).

Table 3: Distribution of farmers according to their livestock possession

(n=150)

Animals	Livestock possession				
	<2	**3-4**	**5-6**	**7-8**	**9-10**
Buffalo	92 (61.33)	8 (5.33)	4 (2.66)	1 (0.66)	1 (0.66)
Cow	48 (32.00)	12 (8.00)	0	0	0
Bullock	82 (54.66)	0	0	0	0
Sheep/Goat	68 (45.33)	2 (1.33)	12 (8.00)	7 (4.66)	10 (6.66)

Note: Figures and parenthesis indicate percentages

3.2 Adoption regarding recommended production technologies by the soybean farmers

The recommended production technologies contribute greatly to the yield of the crops. Required knowledge about package of practice recommended are the pre-requisite for their use in crop production. Lack of knowledge leads to improper adoption of production technologies. The study showed that the farmers lack in knowledge and adoption in practices like calculation of fertilizer dosage, seed treatment, seed inoculation with bio-fertilizers and application of zinc sulphate. These findings mentioned below are the observations noticed during data collection.

3.2.1 Recommended variety

The table-4 reflected the knowledge and adoption level of the soybean growers aboutthe independent recommended production technologies. It was clear that the farmers have complete knowledge about the recommended variety (Dsb-21), there is a complete adoption of the particular variety recommended. The farmers aware of the improved variety released by the university which is high yielding and rust resistant compared to the existing other localprominent varieties.

3.2.2 Sowing time

The results with respect to sowing time indicated that about 95 per cent of the farmerhad knowledge and 86.67 per cent of the farmers adopted recommended sowing time in the kharif season. Farmers are practicing soybean cultivation since many years, majority of the farmers knew it is a rainfed crop and prefer kharif season to get better yield from soybean cultivation.

3.2.3 Spacing in the field

When it comes to spacing in the field about 88.00 per cent of the farmers had knowledgeand 85.33 per cent of the farmers adopted spacing that was recommended. Almost all farmersuse seed drill for sowing of soybean seeds, this may be the reason that majority are aware andadopted correct spacing in the fields.

3.2.4 Seed rate

About seed rate (65.33%) and of the farmers had knowledge as recommended and 80.67 per cent of them have adopted recommended seed rate of 25kg/acre. The adoption of recommended seed rate is more compared to knowledge about required seed rate because, 25kg bag of DSb-21 seeds are made available to the farmers from the production centers and local RSKs as it is recommended for the variety.

3.2.5 Seed treatment

It was noticed that, farmers have low level of knowledge about seed treatment (21.33%) and seed inoculation with rhizobium culture (12.00%). 39.33 per cent of the farmers follow seed treatment and only 27.33 per cent of them adopted seed inoculation with rhizobium culture. The reason behind the adoption of the above recommended practices are low cost of the practices, own resource use neglecting external agency and simplicity of the practice which can be practiced by mere knowledge. Further based on their farming experience farmers realized themselves about the usefulness of the practices recommended.

3.2.6 Application of FYM/Compost

It was observed in the recommended production technologies about application of farm yard manure of 2.5 to 5 tonnes per acre, 98.00 per cent of the farmers have knowledge on farm yard manure application but 80.66 per cent of the farmers adopted as recommended. As farmers knew that soybean is leguminious crop where left over crop residues used as a manure to the crop. The other possible reason for non-adoption may be due to non –availability of FYM and high cost. Most of the farmers realized and convinced about the profitability and better yield through application of recommended manure, and they are assured of better returns on investment. So majority of the farmers follow application of farm yard manure as recommended.

3.2.7 Chemical fertilizer application

Whereas, regarding chemical fertilizer application. About 89 per cent of them had knowledge about recommended dosage of application of NPK fertilizers with Zinc sulphate but only 37.33 per cent of the farmers have adopted as recommended. The main reason behind the findings are complexity of recommended dosage application or might be due to the fact that they apply Diammonium phosphate fertilizer and Urea which has been traditionally practicing from many years to the crop. Few farmers those who tried practicing recommended NPK application expressed about high cost, complex procedure of prescribed dosage application, some expressed about non-availability of the zinc-sulphate locally are the main reasons for non-adoption.

3.2.8 Time of chemical fertilizer application

The table further revealed that, 90.67 per cent of the farmers had knowledge about correct time of chemical fertilizer application at the time of sowing and 83.33 per cent of the farmer adopted it, but 16.67 per cent of the farmers neglected the recommended practices fall under non adoption

category. The reasons here may be due to lack of knowledge about correct time of fertilizer application during sowing. Some farmers apply FYM/Compost in the soil three weeks before sowing and remaining dose of chemical fertilizers at the time of sowing which is traditionally being practiced from many years.

3.2.9 Intercultural operations

From the table, in case of intercultural operations like hoeing and hand weeding, About 98 per cent of the had knowledge about hoeing and cent per cent of the farmers have adopted it. In case of hand weeding, the farmers 89.33 per cent of them had knowledge and 68.00 per cent of the farmers adopted it. The hoeing done in the soybean field loosens soil, promotes nutrient uptake, avoids weed plants and helps to obtain better yields which had been followed and known by the farmers since many years. As weeds are quite common and weeding is a labour intensive work or may be due to high wage rates some of the farmers neglect two times hand weeding as recommended.

3.2.10 Weedicide application

About 63.33 per cent of the respondents had knowledge about weedicide application and 41.33 per cent of the farmers adopted have adopted it. But majority (58.66%) of them neglect weedicide application. The reason here is lack of knowledge about the chemicals, weedicide usage and high cost.

3.2.12 Plant protection measures

In case of pest and diseases control 58.67 and 62.67 per cent of the respondents had adequate knowledge and equal number of adoption was seen in adoption and non-adoption ofplant protection measures (48.00%) and (48.00%) respectively. As bacterial blight is the severe problem for the farmers in the recent years, these will be the major reason attributed for taking up of plant protection measures. Nowadays in order to control blight the farmers took up Dithaenium-45 and Agromycin spray.

Table 4: Extent of Knowledge and Adoption of recommended production technologies

(n=150)

Sl. No.	Recommended production technologies	Extent of Knowledge		Extent of Adoption	
		f	%	f	%
1	Recommended variety	150	100	150	100
2	Sowing time (1st week of June to 15th July) (Other than recommendation-Sowing in the month ofMay)	142	94.67	130	86.67

3	Spacing (30 x 10 cm) (Other than recommendation- Broadcasting/Approximate spacing like 20x15 and25x10 cm)	132	88.00	126	85.33
4	Seed rate (25kg/acre) (Other than recommendation-30-35 kgs/acre)	98	65.33	121	80.67
5	Seed treatment (Carboxin or Thiram 100gm/kg) (Other than recommendation-Captan/Vatavax-2-3gms/kg)	32	21.33	59	39.33
6	Seed inoculation (treating seed required per acre with Rhizobium culture-500gm)	18	12.00	41	27.33
7	Application of FYM/Compost (2.5-5 tonnes/acre) (Other than recommendation-<2.5 tonnes as it is leguminious crop residues are left behind)	147	98.00	121	80.66
8	Chemical Fertilizers application (Kg/acre)				
a	Total dose of recommended fertilizer-16:30:10 NPKand Zinc sulphate (5kg/acre) (Other than recommendation - A bag of DAP/acre or approximate application of 10:25)	132	88.50	56	37.33
9	Time of chemical fertilizer application (Mix FYM/Compost and entire dose of chemical fertilizers insoil when the land is ready for sowing) (Other than recommendation-DAP+Urea (bag/acre)	136	90.67	125	83.33
10	Intercultural operations				
a	Hoeing (2 times)	148	98.67	150	100
b	Hand weeding (2 times) (Other than recommendation- No or only once)	134	89.33	102	68.00
11	Weedicides application (Allachlore, Chlomazon, Chlorimuran)	95	63.33	62	41.33
12	Plant protection measures (for disease and pest control)				

	Pest and Disease management			**Extent of Knowledge**		**Extent of Adoption**	
I	**Pest**	**Chemical**	**Dosage**	**f**	**%**	**f**	**%**
i	Stem fly and pod fly	Prophenophos or Mithomy	2ml/lit of wateror 0.6 gm/lit ofwater	32	21.33	18	12.00

ii	Girdle beetle	Phorate or Carbofuran	4kg/acre or 12kg/acre mixed in the soil at the timeof sowing	15	10.00	8	5.33
iii	Spodoptera, Semilooper and BHC	Monocrotophos or Quinalphas	1.25 ml/lit of water or 2ml/lit of water	40	26.66	26	17.33
vi	Leaf minor	Monocrotophos	1.25 ml/lit of water	34	22.66	21	14.00
v	Thrips	Phosphamedan orImmidachlorid	0.5 ml/lit of water	20	13.33	14	9.33
II	**Disease**	**Chemical**	**Dosage**	**f**	**%**	**f**	**%**
i)	Purple seed stain	Carbandizium	1gm/lit of water	12	8.00	4	2.66
ii)	Bacterial leaf spot	Agrimycin or Streptocyclin or Copperoxychloride	0.5 gm/lit of water or 2.5 gm/lit of water	48	32.00	26	17.33
iii)	Rust	Hexachonazol or Propiconozal or neem oil	1 ml/lit of wateror 10 ml/lit of water	69	46.00	48	32.00
iv)	Yellow mosaic	Oxymetal methyl or Trizonophos	10 ml/lit of water or 1.5 ml/lit of water	23	15.33	18	12.00
v)	Charcoal rot and collar rot	Thirum or capan	2-3 gm/kg of seeds or 2gm/litof water	18	12.00	22	14.66
	(Other than recommendation- Amithexam 15g/pump for stem fly, Thiram/Hexaconazol 2-3ml/lit for rust disease, Immomectin benzoate 0.3g/lit for caterpillars.						

f-Frequency, %-Percentage

3.3 Overall adoption of recommended production technologies by the soybean farmers

It has been concluded in the Table-5 that, about 64.00 per cent had medium level of adoption about recommended cultivation practices of soybean, whereas, only 9.33 and 26.66 per cent of the soybean farmers belonged to high and low level of adoption category,respectively. The findings of the present study are in the line with the findings Arya *et al.*(2014), Sani (2018) and Manjushree (2018). The study concluded that the soybean growers had medium adoption regarding recommended cultivation practices.

Table 5: Overall adoption level of the soybean growers about recommended production Technologies

(n=150)

Sl. No.	Category	Frequency	Percentage
1	Low (< 23.25)	40	26.66
2	Medium (23.25 – 25.41)	96	64.00
3	High (> 25.41)	14	9.33
Mean: 24.67		**SD: 2.82**	

4. CONCLUSION

The soybean farmers had better adoption on recommended cultivation practices. However, recommended production technologies contribute greatly to the yield of the crops. Required adoption of package of practice recommended are the pre-requisite for their use in crop production. Lack of knowledge leads to improper adoption of production technologies. The study further noticed that the farmers lack in knowledge in practices like Nutrient management (Application of Sulphure @2kg/ha), Pest management (Flubendiamide @ 0.5g/lit), Weed management (Pendimethalin, pre-emergence application of herbicides), management of chilly mites by chlorfenapyr, Foliar nutrition of potassium nitrate, applicationof bio-fertilizers and organic farming practices in soybean. Hence, the concerned agencies/department need to create enough knowledge and adoption on these issues.

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