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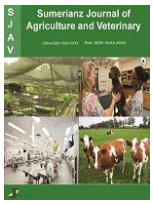

Original Article Open Access

Training Needs Assessment for Groundnut Production Technology of Groundnut Growers in Rain Fed Tract Punjab Pakistan

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Abstract

Groundnut (ArachishypogeaL.) being annual kharif legume crop has not been given special attention in past. There are multiple uses of this crop worldwide and in Pakistan. It is an excellent cash crop for rain fed areas of Pothwar having potential to get foreign attention through export. Present study was planned to evaluate the training needs of groundnut growers regarding its scientific production technology. Respondents (240) were interviewed from Tehsil Jand of district Attock randomly. Enormous number of respondents were having satisfactory knowledge about 3-4 ploughing while preparing the land. Most of the respondents were having excellent knowledge level about planking. The results depicted that 39.5% respondents were having fair type of knowledge about fertilizer application at the time of land preparation. Knowledge level for registered varieties (BARI-2000, BARD-479, Golden and BARI-2011) was inconsistent. Knowledge about sowing of groundnut with tractor mounted drill was in satisfactory. There was average level of knowledge to differentiate between healthy and diseased seed. While, appropriate seed rate usage for cultivation was observed to be of low importance. Most of the farmers were unaware about the sowing time from 25th March to 31st May. Poor farmer's knowledge (23.75%) of hoeing after 3-4 weeks of sowing was observed and good level of familiarity at flowering stage was recorded. Recommended dose of nitrogen application was (31.25%) with about 28.33 % respondents were having good level of knowledge for recommended P application. Potassium application knowledge was recorded below 50% of farming community, while 45.83% respondents were with poor knowledge of K application. Mostly (52.50%) respondents were unaware of the advantages of the gypsum application. Maximum knowledge level for mechanical harvesting was observed (23.33%) in satisfactory category and (26.25%) of conventional methods under same level. It has also been found from results that farmers are not well aware about advantages of gypsum so there is need of increasing awareness level of farmers about benefits of gypsum application. This study has concluded that institutions should play their role to educate farmers for adoption of advance production technology to get good production from this cash crop.

Keywords: Arachis hypogea L.; Groundnut; Training needs; Groundnut growers; Punjab; Pakistan.

1. Introduction

Groundnut (*Arachis hypogea* L.) being an oilseed crop is commonly known as peanut, earthnut, moongphalli in Urdu. It is only cultivated species of *Arachis*. Globally, it is cultivated under arid and semiarid areas [1]. This is native to South America [2]. This is an annual plant with erect structure. It has distribution in temperate, tropical and subtropical zones. The subtropical areas situated 45^{o}N and 35^{o}S at 1000 meters above sea level, are groundnut producing countries. It is said that groundnut was domesticated long time before Spanish subjugation. The Spaniards took groundnut with them when they returned to Europe. Later the traders from Asia and Africa were the cause of spreading groundnut in both continents [3]. Overall groundnut production is associated with rainfall and susceptible to severe drought, frost and standing water. It is grown on wide range of soil types [4]. It requires light sandy soils for good growth and yield, also grown on marginal lands [1]. Soil of rain fed areas which are mostly deficient in essential nutrients, moistures and organic matters are suitable for its cultivation [5]. It has characteristic of biological nitrogen fixation process aiding in soil reclamation and improves soil fertility [6].

Pakistan is major groundnut producing country and due to various biotic and abiotic factors farming community is not able to get higher production in comparison to developed countries. During 2015-16, Rawalpindi division has an area of 190174 acres comprising of 197 acres irrigated and 188197 acres un-irrigated. Among districts of Rawalpindi division Attock has major role in production of groundnut. District Attock has total 49,679 acres among

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which 779 acres are irrigated while 48,900 acres are un-irrigated. Total groundnut production in Attock has 15108 tonnes [7]. Among the Tehsil of Attock, Jand has major contribution so there was need of study for training need assessment to solve the problem. The decline in groundnut production is due to social status of farming community. The groundnut producing farmers are less educated and have limited access to advanced production technologies. Meanwhile, the farming communities of groundnut producing areas have poor agronomic knowledge, and they don't have access to many of inputs required for its production. Due to less awareness about new high yielding cultivars the farmers grow old low yielding cultivars as well as they use their own field seed from the previous year which results into low crop productivity [8]. It is primary responsibility of agriculture extension workers that they should pay attention to upgrade skills of the farmers to increase production [9]. Agricultural production is much low in Pakistan as compared to many other worldwide [10]. The improved management practices for the production of quality groundnut include; use of quality disease free seed, land preparation, seed rate and its spacing, sowing method, fertilizer application, irrigation, weeding, disease control, harvesting, threshing, processing and storage. To perform these operation farmers need trainings in relevant field which is the primary responsibility of extension field staff [9].

Agricultural Extension workers play an impotent role in training of farmers and also promote agricultural development by providing the extension services and information to the farmer. Extension worker helps farmers to increase the productivity of their farms and improve their living standards. Extension worker has many roles to play as advisor, technician, middleman, operating between agriculture research institution and the farmers [11]. He is a change agent helping farmers to identify their problems and solutions. Well intentional chances for partakers to gain important skill and understanding is referred as training [12]. Training plays an important role in growth of human performance under certain situations. It offers a systematic assistance to partakers to work effectively and efficiently in their given task. It is important for trainees to utilize the knowledge and skill effectively in local communities. Training fills gaps between local and modern agricultural practices [13].

A huge number of advanced technologies have been developed by different government and non-government organizations with objective of uplifting economic status of farmers. But when these new advanced technologies were tested at farmer's field level there was a big gap between yield obtained at research station and at farmer's fields. This variation in yield of field crops pointed out presence of untapped potential [14]. An extension worker can fulfill this gap by providing new and updated knowledge.

Improved agricultural technologies have been proved as an important ingredient for the reduction of poverty in most of the regions of the world. It has also been noted that these new technologies were not adopted at once rather their adaptation was a slow and continuous process. Meanwhile, the advantages of adapting new agricultural technologies were nearly neglected or poorly understood [15]. There could be many reasons of low adaptation rate of new technologies. Capital, less education, poor infrastructure would be considered the causes of low adaptation rate of new technologies [16]. Considering these circumstances a questionnaire was developed and interviewed the groundnut growers to evaluate the needs of training to boost up the production technology of groundnut as cash crop for foreign earning.

3. Materials and Methods

Materials and methodologies utilized in the current study were described as:

Due to large area under cultivation of groundnut research was conducted in Tehsil Jand of district Attock. Total area of Tehsil Jand is 571957 acres, out of which 240952 acres is cultivated land. Remaining area is barren land and under forest. Tehsil Jand is divided in to 02 markaz (Jand and Thatta) and 16 union councils. From MarkazJ and 03 union councils were selected namely Jalwal, Narra and Sagri. Similarly, from Markaz Thatta 03 union council Pindsultani, Thatta and Domail were selected. From each union council 04 villages were selected. From each village 10 respondents were interviewed. It was difficult to collect data from the whole population so convenient sampling technique was used for the present study. A sample of 240 respondents was selected for obtaining required information. Before the survey, interview schedule based on production technology and problems associated with groundnut production was prepared reflect in the knowledge level of farmers and priorities of training program. After selection of specific area, farming community was interviewed at their farms and homes. Benefits of interviews were shared with them to clear their doubts. Asked questions were made understandable to respondents to get more precise and accurate answers from farming community. Collected data were statistically analyzed by using Statistical Package for Social Sciences (SPSS). Conclusions and recommendations were made based on the analyzed data.

4. Results and Discussion

Results concerning demographic factors and knowledge level of groundnut growers about land preparation, variety selection, sowing time and method, disease free seed, seed rate, hoeing, fertilizer application, gypsum

application at flowering, harvesting and storage practices, pests, diseases and their control were compiled after interviews of selected growers with the help of questionnaire. Data was analyzed, summarized and presented in tabular form. In this section results are interpreted and discussed in comparison to previous findings.

Farmer's knowledge regarding various attributes of land preparation like ploughing, planking and fertilizer application was assessed through field survey presented in table1 and fig 1. The required knowledge (2.77) for ploughing depicted that training is desirable in the line of standards provided by scientific community to improve existing situation. Similarly, required, (0.70) means for planking represented that there is no need of training in this case as knowledge level of farmers is good. Whereas, required mean (2.62) for fertilizer application elaborates that training is needed for educating farming community against benefits for nutrients application and deficient losses. Similar results were produced by Sher Muhammad and Malik [17] who stated that adoption for recommended instructions to farming community positively varied among respondents. Likewise, Dey and Sarkar [18] were of the view that adoption of various agronomic measures has significant impact on harvesting higher yields. Maximum respondents (45.42%) were having satisfactory knowledge. Furthermore, 29.58 and 24.58% respondents were observed to have fair and poor ploughing knowledge. Planking is also valuable practice to conserve available moisture in the soil. During the survey, it was concluded that mostly (55%) farmer's community having excellent knowledge of planking. Meanwhile, 28.33% farmers were recorded as good planking knowledge. Moreover, 1.25 % respondents were of poor knowledge for benefits of planking to conserve moisture and suppress weeds infestation. Application of fertilizer at the time of sowing not only produced good crop stand but also provided even germination in the field. As newly germinated seedlings need sufficient quantity of nutrients to establish themselves during early growth stages. Data regarding fertilizer application depicted that 39.58% respondents had fair knowledge for fertilizer application at the time of sowing to get good returns of the groundnut, whereas, 33.33% respondents were with satisfactory knowledge for fertilizer application. The means for ploughing showed that respondents possessed knowledge (2.22) between fair and satisfactory. Further it can be concluded that respondent's knowledge was more tended towards fair category for ploughing. Possessed knowledge mean (4.29) for planking depicted farmer's awareness between good and excellent level showing more trend towards good category. Moreover, huge information gap exists for timely fertilizer application. Additionally, possessed knowledge mean (2.37) showed between fair and satisfactory levels but more trends towards satisfactory. Selection of best suitable variety/cultivar for specific area in rain fed conditions is of prime importance to get maximum yield with available resources.

Available groundnut varieties have varied yield potentials to prevailing environment. As there is huge gap between registered varieties and farmers own seed, not only for yield but also to the disease resistance. Most of the registered varieties have potential to survive under adverse climatic conditions. While, household seed don't have capability to produce higher yields as they are not tolerant to various biotic and abiotic stresses. Availability of registered groundnut cultivars to groundnut growers was found to be limited as per demand. Farmer's knowledge for variety selection was assessed during the field surveys. It was observed that 75.83% farmers were found to have poor knowledge of BARI-2000 variety (Table1 and Fig 2). Moreover, 14.17% and 8.33% respondents were under fair and satisfactory knowledge category. Moreover, knowledge assessment for BARD-479 elaborate those 45.42% respondents were having satisfactory and 23.75% good knowledge of this variety, whereas, only 1.25% was recorded to be lowest value of observed farming community having excellent knowledge. Likewise, 23.33% respondents were of fair knowledge for golden groundnut variety and 21.25% farmers of poor awareness category. Additionally, good and excellent categories were statistically similar (17.92%). Similarly, 59.58% respondents were under poor category for BARI-2011 variety and second highest 25.83% of fair knowledge. While only 1.25% farmers were of excellent knowledge of BARI-2011.Results revealed that possessed means (1.36) for BARI-2000 showed higher inclination of farming community towards poor knowledge level. Whereas, means of possessed value (2.83) for BARD-479 reveals that farming community have knowledge level between satisfactory and good pools but more tilted toward satisfactory knowledge level. Possessed mean (2.87) against golden groundnut depicted trends between fair to satisfactory pools of familiarity but more inclined toward satisfactory level of knowledge. Result outcomes showed that required mean (3.63) for BARI-2000 exhibit that there is dire need of farmers training. Whereas, required knowledge mean (2.16) for BARD-479 exhibits efforts through trainings are required to improve the knowledge levels of farmers. While, required means (2.12) showed that fair category of knowledge is needed to enhance familiarity for better yield. Possessed mean (1.62) for BARI-2011 exhibited higher farmer's trends between poor and fair levels. Whereas, required mean (3.37) for golden groundnut explains huge difference between possessed and required knowledge level, trainings are highly desirable. This happened due to less effort of extension department as when they didn't visit to farming community to educate them for advanced production technology as well as recently released cultivars. Knowledge about the locally tested cultivars is important for farming community to get higher yield. In this case extension workers have to play pivotal role in educating the groundnut growers about newly released varieties which are more tolerant to various environmental stresses. Utilization of farmer knowledge and experience for abandonment of newly released cultivars has positive impact on adoption rate was

concluded by Moser and Barrett [19]. Availability of valuable seed and farmers' knowledge of newly released cultivars, a main reason for lower yields were assessed by Ahmad, *et al.* [20], during interviewing respondents. Reduced averaged productivity was due to inefficient variety adoption decision [21].

Method of sowing is of prime importance to obtain higher crop yields. Farmer's knowledge for drill sowing of groundnut was assessed during survey and maximum (41.25%) respondents were recorded for having satisfactory knowledge. Moreover, 27.92% farmers were of fair and lowest (6.25%) under poor knowledge category was recorded. Additionally, possessed mean (2.97) reveals respondents trend between fair and satisfactory knowledge levels. Whereas, required (2.02) level exhibit that farmer's awareness needed to be improved and trainings are highly desirable(Table1 and Fig 3).Huge knowledge gap for sowing method is might be due to unavailability of advanced machinery and interaction of farming community with research organization. This gap can be filled by educating farming community against the use of modern sowing techniques through field demonstration at lower levels. Similar results were concluded by Meena and Punjabi [22] who observed significant variation among farming community knowledge for adoption of new crop production technologies.

Healthy seeds produce healthy seedlings. Seed vigor and viability are of much importance for a good crop stand. Seeds affected with funguses, bacteria or viruses don't have capability to produce higher yields, infect they become stunted and ultimately lower the produce value. Farmer's knowledge about the utility of diseased seed for sowing was tested during field survey.

Data presented in Table 1 and Fig 4 depicted that maximum 33.33% of respondents were of excellent knowledge. Whereas, 22.08% was second highest value recorded of fair knowledge for using disease free seed of groundnut. While only 8.75% respondents were observed of poor knowledge. Possessed knowledge of surveyed farming community exhibit mean value (3.45) which elaborates that respondent's knowledge is between good to excellent levels. Whereas required knowledge mean (1.54) depicted that trainings are needed to educate farming community against the use of healthy seeds for better yields. Seed treatment against various seed borne diseases has key importance for good crop stand. Extension department should take bold decision for availability of good quality seed. Moreover trainings of farming community on the use of good quality (diseased free) should be conducted to educate them against the seed treatment prior to sowing. Van Campenhout, *et al.* [23], were of the view that lower crop yields can be improved by using disease free quality seed. Likewise, assessment of farmers capacity and their knowledge for using quality seed recognition are basic necessities to strengthen skills and enhancement of crop yields was proposed by Kudadjie [24]. Appropriate seed rate is important to establish desired plant population in the field. Extensive or lower seed rate both are not desired practices as more plant population can have competition among crop plants for soil nutrients and moisture as well. Seed rate is adjusted according to the sowing time, as higher seed rates are recommended for late sowing of various crops. While in case of groundnut recommended seed rate is 70 kg nuts per acre to establish even crop stand.

During field survey of groundnut growers it was recorded that maximum (28.33%) of interviewed farming community were of poor knowledge for appropriate seed rate, whereas, satisfactory and fair knowledge were statistically similar (26.67, 26.25%) respectively. Lowest percentage 1.67 was recorded of excellent knowledge (Table 1 and Fig 5).Possessed mean (2.37) depicted higher trend between fair to satisfactory knowledge levels. Conversely required mean (2.62) reveal that training is needed to teach farming community for using recommended seed rate. Due to lack of awareness among farming community for capacity of germination, higher seed rates are used for number of field crops were noticed by Kudadjie [24]. After dragging farmers attention towards print and social media for using appropriate seed rate. Mostly farming community was well aware of the recommended seed rate of paddy was concluded by Basu and Leeuwis [25]. Extension workers should distribute literature and conduct farmer meeting prior to sowing of groundnut regarding importance of proposed seed rate to educate them. Number of studies has been conducted to evaluate most suitable sowing date for groundnut sowing. Decision of sowing time has critical importance to get higher yields. Late sowing of various crops results in yields reduction for various crops has been concluded by many studies. Reduced yields are due to insufficient heat units and escape of phonological stages. Time of sowing is mainly dependent on availability of soil moisture to meet the initial water requirement for even germination. Similar trend was observed during survey in the study area. Different sowing dates were recorded in practice of groundnut growing farming community.

Observed data depicted that maximum (49.58%) of respondents were of poor knowledge of sowing after 25th March. Similarly 25.00% fair and 12.08% were of satisfactory knowledge of plantation on said date whereas; only 4.58% were of excellent knowledge. Possessed mean value (1.93) depicted more trends between poor to fair knowledge levels (Table 1 and Fig 6). Required (3.06) means revealed alarming situation for trainers to make effective protocols to enhance farmer's knowledge up to excellent knowledge level. Significant variation among opinions of farming community might be due to the moisture availability at the time of sowing or due to the late harvest of Rabi crops. Contribution of sowing time to huge differences in yield potential and actual yield is costless technology and need to be improve farmers knowledge for timely sowing to provide ideal conditions for higher

yields was suggested Ramasubramanian, *et al.* [26]. Crops yield and quality are adversely affected with weed infestation in the field. They not only compete for nutrients and soil moisture but also provide suitable environment for various insects and diseases. Others drawbacks of weeds are that they become hurdles at the time of harvesting of crops. Numbers of methods (mechanical, biological and chemical) to control weeds infestation in the field of groundnut are available to farmers of modern age. Time of hoeing is of critical importance as was studied during the survey. Seed contact to air is broken of the weeds seed near the surface and restrict the germination. Hoeing disturb capillary action at the surface protects evaporation losses of soil water.

Data presented in Table 1 and Fig 7 indicated that maximum 51.25% respondents were having poor knowledge of hoeing after 3 to 4 weeks and second highest percentage (15.42) of having good familiarity. Similarly, lowest (6.67%) farming community was assessed of excellent hoeing knowledge. Other critical stage for groundnut crop is at the time of flowering. Weeds control at this time is necessary to minimize the competition between crop plants and unwanted plants. Presented data depicted that highest (23.75%) farming community was having good knowledge of hoeing at the time of flowering. Moreover, poor and fair knowledge categories were statistically similar (22.50, 22.08%) respectively. Minimum (10.83%) respondents were having excellent familiarity of hoeing at flowering. Possessed mean value (2.13) for hoeing after 3-4 weeks indicate higher trend between poor and fair knowledge levels. Likewise, possessed mean value (2.78) for hoeing at flowering stage indicates satisfactory to fair knowledge trend. Required mean (2.86) for hoeing after 3-4 weeks indicate that training is needed to enhance farmer's knowledge for higher productivity. Whereas, required means (2.21) for hoeing at flowering stage reveals that trainings are needed to improve the situation. For enhancement of farmers awareness of doing hoeing at the time of flowering to reduce crop competition and increase productivity, higher adoption rate of farming community for manual weed control in Handia and Phulpur were noticed by Kapoor [27] due to unawareness of other weeds control methods to control summer weed Optimum application of nutrients is of prime importance from production point of view. A number of synthetic fertilizers are available in the market which when added to soil; enhance soil fertility and productivity as well. Proper knowledge of desired nutrients is necessary to obtain good yields.

Data presented in Table 1 and Fig 8 revealed that maximum 32.92% respondents were having fair knowledge of using 12Kg N per acre followed by 31.25% good familiarity. Moreover, only 5.42% respondents were having poor fertilizer knowledge @ 12kg/acre N. Phosphorous application to groundnut is important for development of newly emerged seedlings. Most of the phosphate fertilizers are applied at the time of sowing to meet the initial demand of crops. A number of studies have been conducted so far to calculate the recommended dose of phosphorous for groundnut. Maximum 28.33 percent respondents were well aware of the recommended P application, while satisfactory and good recommended P knowledge was 23.33, 21.67% respectively. Normally Pakistan's soils are not deficient in Potassium but its application at recommended rates has enormous benefits for healthy crop growth. Respondent's awareness against K application depicted maximum 45.83% poor knowledge. The second highest 39.17% was of fair knowledge level. Lowest percentage (3.75%) was recorded of good familiarity of recommended K application. Possessed means (3.15) indicate that most of the respondent's knowledge about using 12Kg N/acre exist between good and fair knowledge pools. Mean value of possessed knowledge (3.00) reveals that maximum knowledge about application of Phosphorous was between satisfactory to excellent level. Possessed mean (1.84) reveal higher concentration of K application between poor and fair knowledge levels. Results revealed that required mean (1.84) for using 12Kg N/acre exhibit little information gap and needed to be filled. Required mean (2.00) for application of phosphorus exhibits that more training is needed to be done of fair knowledge level. Farmers' awareness for judicious phosphorus application is of prime importance as inadvisable P applications can cause soil infertility. Whereas, required awareness mean (3.15) for application of K depicted that huge efforts are need to be done to improve knowledge levels. Recommended application of NPK fertilizers to field crop is important to get higher yields. Great proportion of farming community to have good knowledge of timely and optimal fertilizer application is necessary to obtain good yield returns on country level was reported [28]. Less quantity of nitrogen is required by groundnuts being a legume crop. Our results are in conformity with Angstone [29] who observed poor farmers knowledge against recommended nitrogen application.

Gypsum application to groundnut crop is essential for good and quality pod yields. As Pakistan's soil are deficient in Ca especially in groundnut growing areas. Calcium is needed both for vegetative growth and development of fruit. Application of recommended dose of gypsum was assessed in field survey (Table 1 and Fig 9) and it was concluded that mostly respondents (52.50%) were of poor knowledge for gypsum application. Fair & satisfactory were second and third highest knowledge levels of farming community (15.83, 14.58%). Possessed mean (2.08) depicted higher trend between poor and fair knowledge levels. Whereas, required means (2.91) depicted that much effort need to be done to increase farmer's knowledge for application of gypsum. There is need of the time to educate the farmer's community about the benefits of gypsum application at flower initiation. Extension department and individuals should distribute literature and conduct seminars to educate them and policies should be

followed for easy access to farmers on cheap price. The results are in conformity with Doddamani [30] who concluded lack of farmers knowledge for benefits of gypsum application

Timely harvesting of groundnut is critical operation. Crop specific knowledge about physiological and harvest maturity is of prime importance for higher yields. Most suitable method for harvesting of groundnut is mechanical way to minimize post-harvest losses. Manual pulling of plants and ploughing in between the lines to dig out pods from the soil are more common practices in groundnut growing areas. Yield losses are more due to conventional methods of harvesting as detachment of pods from plants. Farmer's knowledge for modern and conventional methods of tillage was assessed during field surveys. Data presented in Table 1 and Fig 10 revealed that maximum 29.72% respondents were of fair knowledge for mechanical groundnut harvesting. Satisfactory knowledge (23.33%) was second highest value for mechanical harvesting. In comparison with mechanical harvesting conventional methods were also noticed. Maximum (26.25%) respondents were having satisfactory knowledge. Excellent knowledge (23.75%) was recorded as second highest figure for conventional groundnut harvesting. Possessed mean (2.70) elaborates higher trend between satisfactory and excellent knowledge about mechanical groundnut harvesting. Though, possessed mean (3.10) reveals higher trend between satisfactory and excellent knowledge level for conventional methods. Required mean (2.29) for mechanical groundnut harvesting depicted that measures should be taken to improve fair to satisfactory knowledge of farming community. Moreover, required mean (1.89) for conventional methods elaborated that efforts should be made to improve farmer's familiarity levels to enhance productivity. Efforts should be made by extension workers to minimize laborious and expensive methods with modern approach of harvesting. Insufficiency of proper harvest knowledge lead to yield losses and adequate awareness of farming community to better handle their crop through modern age machinery prevent postharvest losses by Kereth, *et al.* [31]. Moreover, Nath, *et al.* [32] were of the opinion that farmers showed their interest for adoption of new harvest technology to minimize postharvest losses of paddy in Bangladesh

5. Conclusion

It was concluded that middle age farmers having ownership of land are usually more leaned towards learning so it might be easy to train growers of groundnut. Growers have low level of knowledge about use of seed rate, time of sowing (from 25th March to 31st May), hoeing (after 3-4 weeks), use of potassium fertilizer, use of gypsum at flowering stage, storage at dry places and control measures of insect pest and diseases. It was concluded that there was more need of training in case of method of sowing, variety selection, awareness about time of sowing gypsum and application. It was also concluded that campaign might be launched to educate the farmers in sectors were they had low level of knowledge.

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Table-1. Rating, Possessed and Required Knowledge Level of Respondents about land preparation, variety selection, method of sowing, disease free seed, seed rate, time of sowing, hoeing, fertilizer application, gypsum application and harvesting regarding Groundnut (n = 240)

Land preparation	**Knowledge level**					**Knowledge**	
	P	**F**	**S**	**G**	**E**	**Possessed**	**Required**
	Percentage					***Mean***	
2-3 ploughings	24.58	29.58	45.42	0	0.42	2.221	2.779
Planking	1.25	6.67	8.75	28.33	55	4.292	0.708
Application of fertilizers	16.67	39.58	33.33	10.42	0	2.375	2.625
Advance variety							
BARI-2000	75.83	14.17	8.33	1.25	0.42	1.363	3.638
BARD-479	13.33	16.25	45.42	23.75	1.25	2.833	2.167
Golden	21.25	23.33	19.58	17.92	17.92	2.879	2.121
BARI-2011	59.58	25.83	7.92	5.42	1.25	1.629	3.371
Method of sowing							
By Drill	6.25	27.92	41.25	11.67	12.92	2.971	2.029
Selection of seed							
Disease free seed	8.75	22.08	17.50	18.33	33.33	3.454	1.546
Seed rate							
70 kg nut acer^{-1}	28.33	26.25	26.67	17.08	1.67	2.375	2.625

Time of sowing							
25 March to 31 May	49.58	25.00	12.08	8.75	4.58	1.938	3.063
Weed Control							
Hoeing after 3 to 4 weeks	51.25	12.92	13.75	15.42	6.67	2.133	2.867
Hoeing at flowers	22.50	22.08	20.83	23.75	10.83	2.783	2.217
Fertilizer Application							
N:12kg acer^{-1}	5.42	32.92	16.25	31.25	14.17	3.158	1.842
P:32kg acer^{-1}	15.00	21.67	23.33	28.33	11.67	3.000	2.000
K:12kg acer^{-1}	45.83	39.17	5.42	3.75	5.83	1.846	3.154
Gypsum Application							
200 kg gypsum at the time of flowering	52.5	15.83	14.58	5.0	12.08	2.08	2.92
Harvesting							
Harvest with tractor	19.17	29.17	23.33	18.75	9.58	2.704	2.296
Harvest with Conventional equipments	13.75	22.08	26.25	13.75	23.75	3.104	1.896

P= Poor F= Fair S= Satisfactory G= Good E= Excellent

Fig-1. Different Knowledge Levels (%) possessed by Farmers for land Preparation P= Poor, F= Fair S= Satisfactory, G= Good, E= Excellent

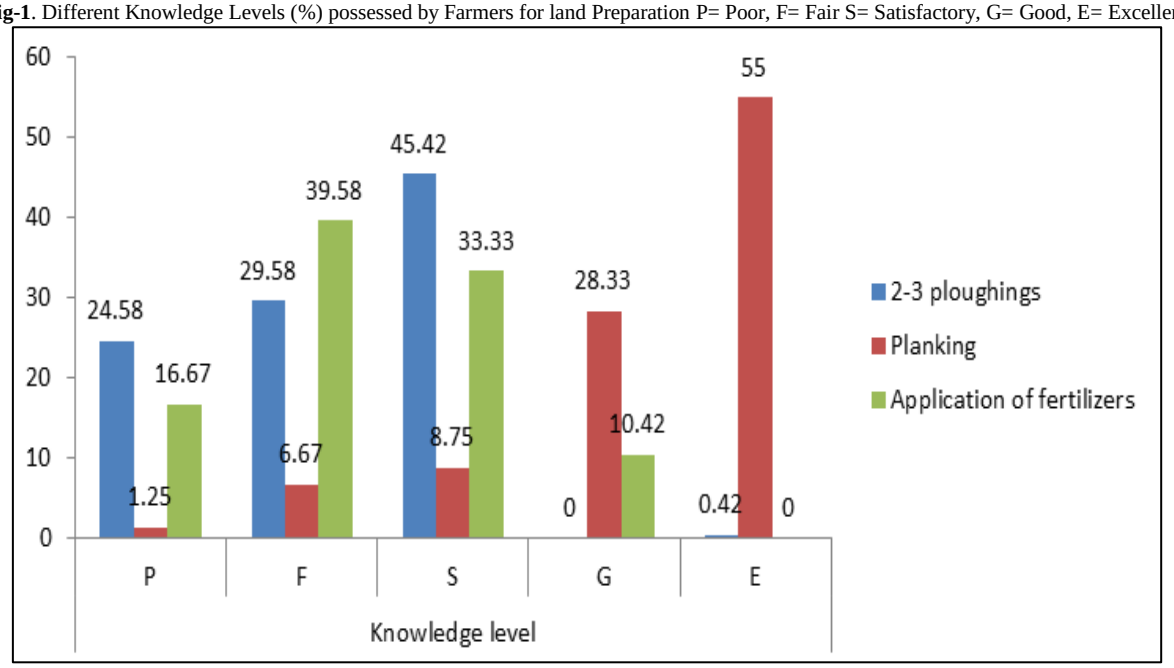
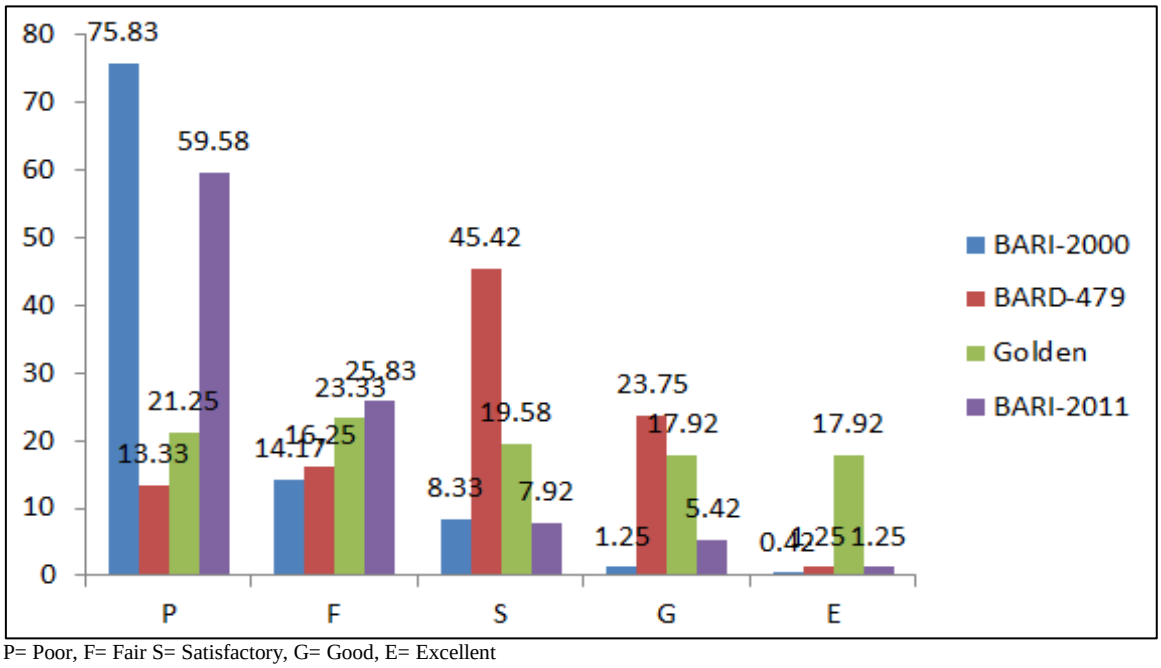
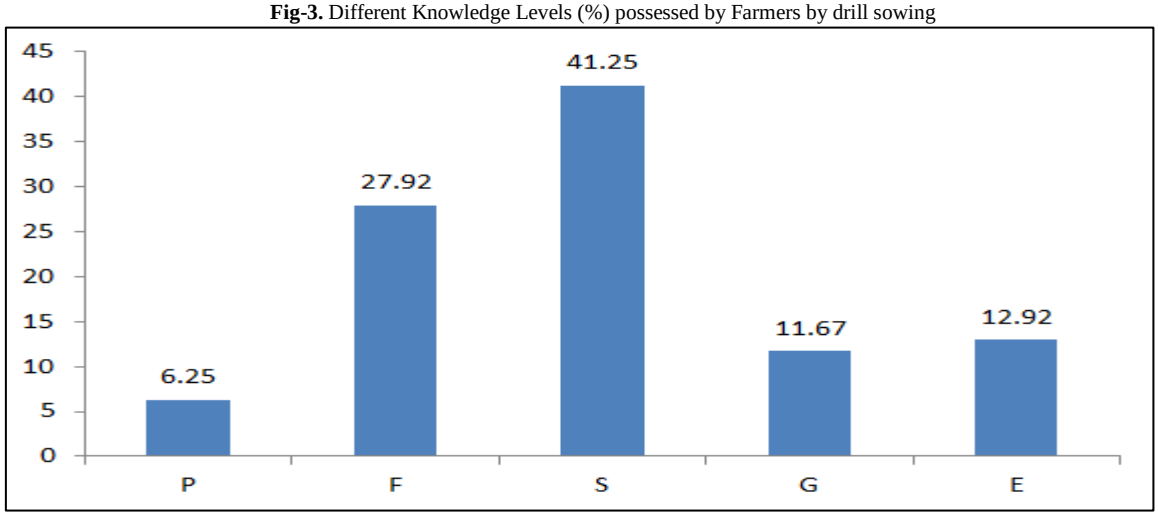


Fig-2. Different Knowledge Levels (%) possessed by Farmers for Advance Variety



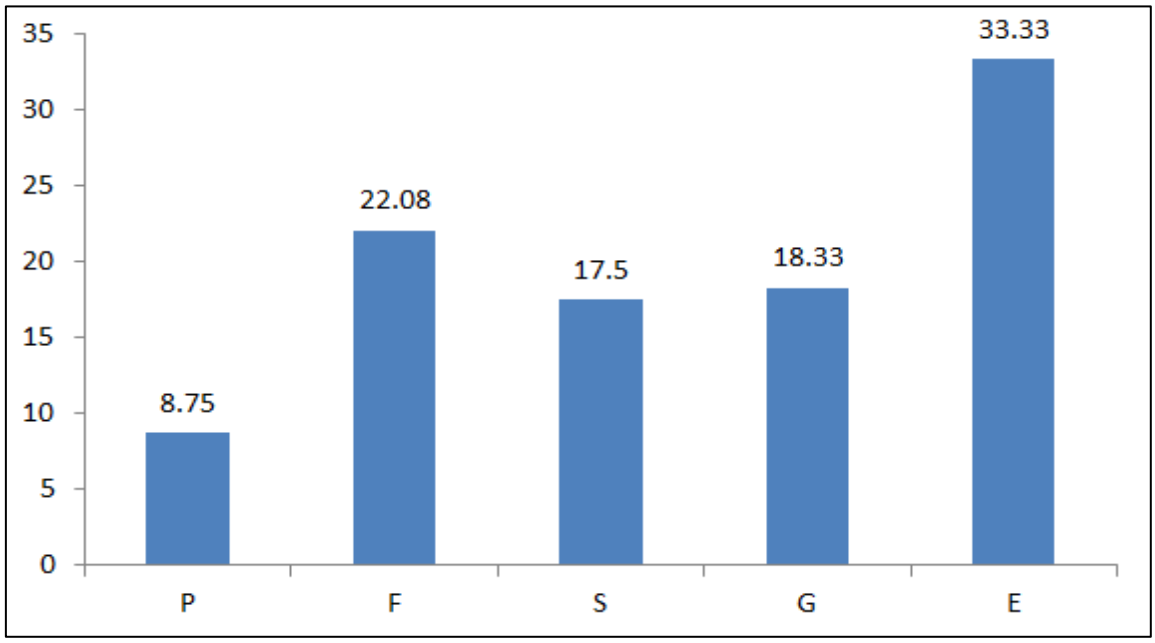
P= Poor, F= Fair S= Satisfactory, G= Good, E= Excellent

Fig-3. Different Knowledge Levels (%) possessed by Farmers by drill sowing



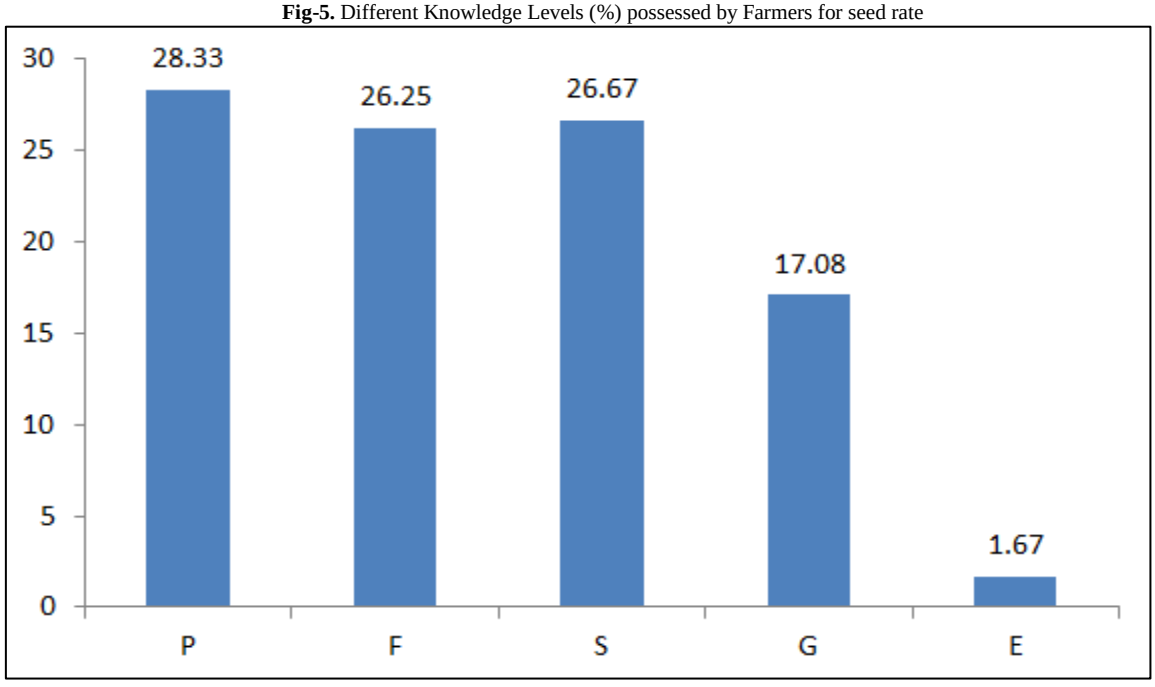
P= Poor, F= Fair S= Satisfactory, G= Good, E= Excellent

Fig-4. Different Knowledge Levels (%) possessed by Farmers for disease free seed



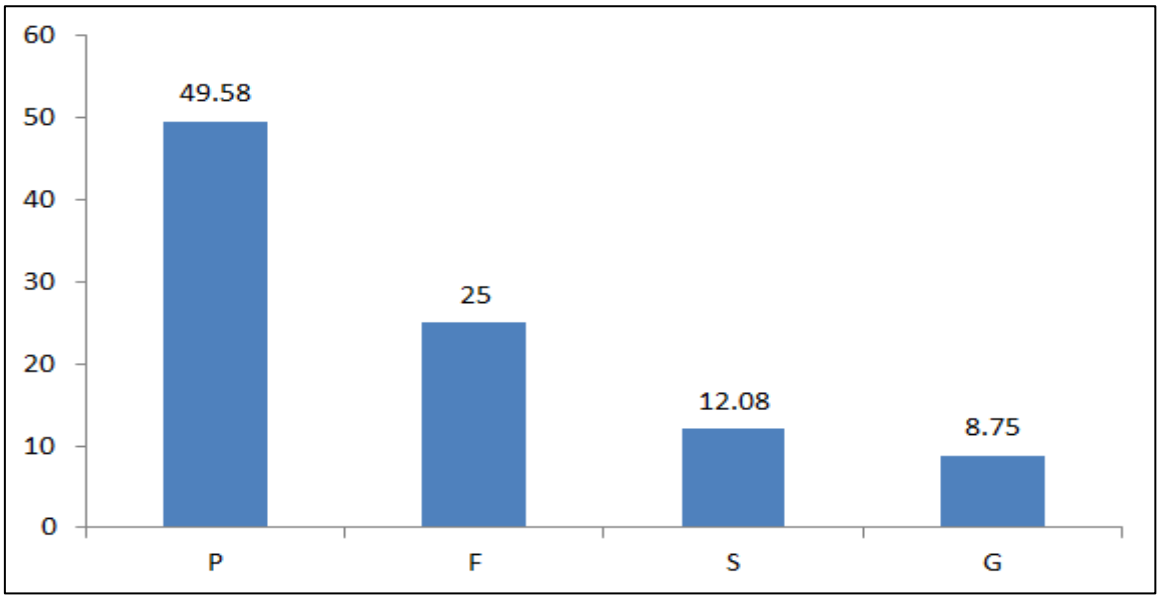
P= Poor, F= Fair S= Satisfactory, G= Good, E= Excellent

Fig-5. Different Knowledge Levels (%) possessed by Farmers for seed rate



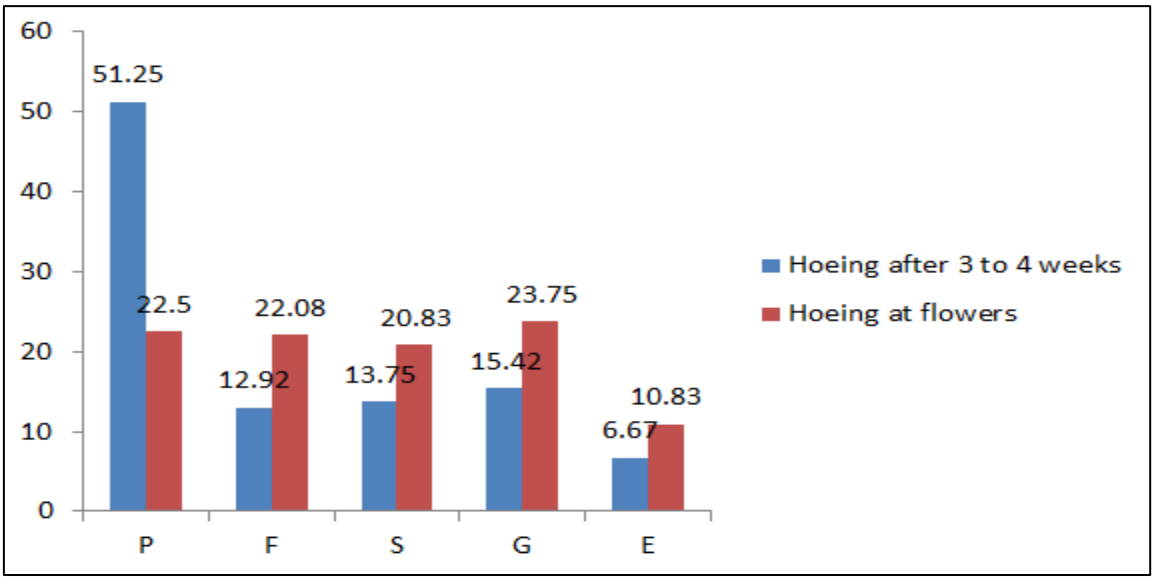
P= Poor, F= Fair S= Satisfactory, G= Good, E= Excellent

Fig-6. Different Knowledge Levels (%) possessed by Farmers for sowing time



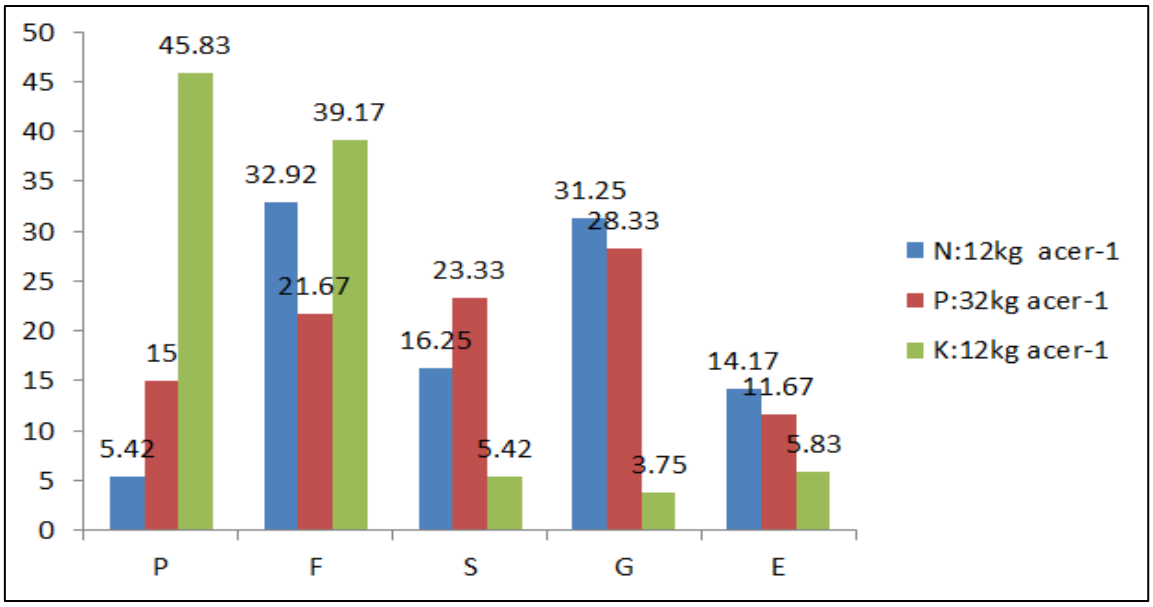
P= Poor, F= Fair S= Satisfactory, G= Good, E= Excellent

Fig-7. Different Knowledge Levels (%) possessed by Farmers for weed control



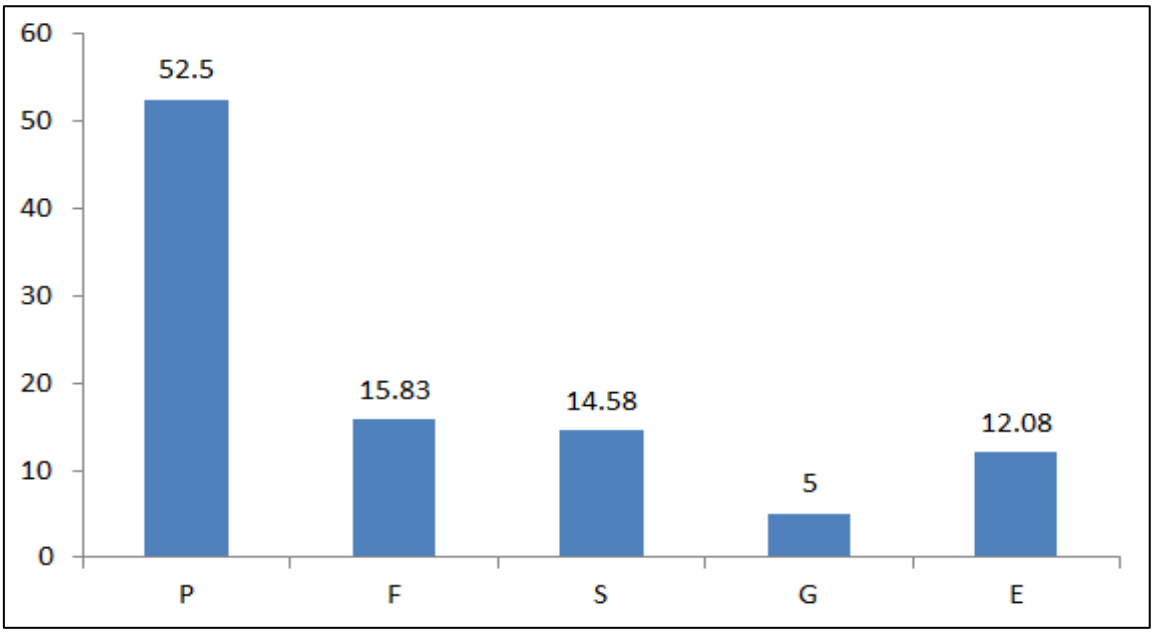
P= Poor, F= Fair S= Satisfactory, G= Good, E= Excellent

Fig-8. Different Knowledge Levels (%) possessed by Farmers for fertilizer application



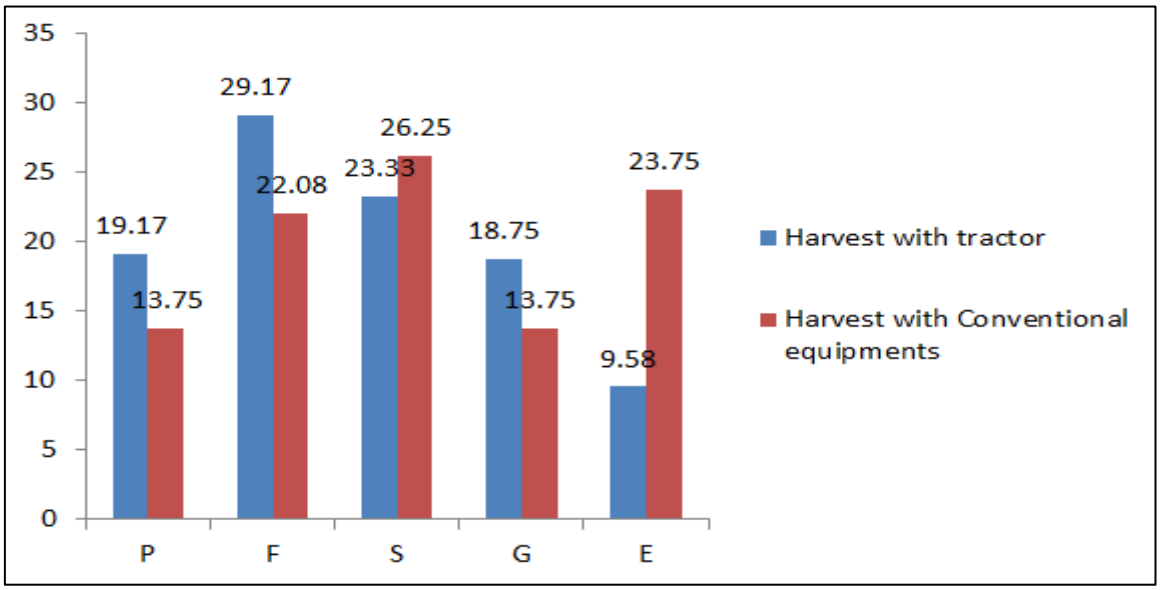
P= Poor, F= Fair S= Satisfactory, G= Good, E= Excellent

Fig-9. Different Knowledge Levels (%) possessed by Farmers for gypsum application



P= Poor, F= Fair S= Satisfactory, G= Good, E= Excellent

Fig-10. Different Knowledge Levels (%) possessed by Farmers for harvesting Techniques



P= Poor, F= Fair S= Satisfactory, G= Good, E= Excellent