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Assessment of Farming/Production Technologies Level Covered by Agricultural Development Programmes on soybean production in Zamfara State Nigeria.

By

Dr. Sani Hamza

Director, Technical Services National Fadama 111 Develpment Programme,Component 1V P M B 1020 Gusau Zamfara State Nigeria.

Abstract

The study assessed the Level of Farming/Production Technologies by Agricultural Development Programmes on soybean production in Zamfara state Nigeria. Interview schedules were administered to 600 respondents which were analyzed by the use of descriptive statistics (frequencies and percentages). The study revealed that majority of the respondents participating and non-participating farmers 31.6% and 30.4% used certified seeds, 24.0%, and 5.6% used early maturing varieties, and 27.6%, and 32.4% while 36.6%, and 16.4% in the study area were found to cultivated local variety soybean. It was also revealed that 0ver 90% of the farmers used or practice ZACAREP improved farming practice such as seed treatment, planting date, cropping system planting method, spacing, weed control, fertilizer application, type of fertilizer used and time of application. The study suggests farmers to begin manage their farms and activities for value addition as commercial businesses, striving to achieve increased competitiveness through technological innovation.

Keywords: Level of Farming, participating and non-participating farmers Production Technologies, Programme & soybean,

1.0 Introduction:

Zamfara State Comprehensive Agricultural Revolutionary Programme (ZACAREP) which was performing the functions of the ADP illustrates how agricultural extension programme was used to enhance farmers' knowledge and skills, as well as promote and expand improved technologies that affect farm productivity (Auta and Dafwang,2010) It was also recognized by Doss (2003; and Idrisa *et al.,* 2012), that one way of improving agricultural productivity, in particular and rural livelihood in general, is through the introduction of improved agricultural technologies to farmers

Soybean is among the major industrial and food crops grown in every continent. The crop can be successfully grown in many states in Nigeria using low agricultural input. Soybean cultivation in Nigeria has expanded as a result of its nutritive and economic importance and diverse domestic usage. The benefits of soy bean (*Glycine max* (*L.)Merr*.) over other grain legumes commonly grown by small holders, such as groundnut (*Arachis hypogaea (L.*), cowpea (*Vigna unguiculata* (L.) *Walp*.) and common bean (*Phaseolus vulgaris (L.*), include lower susceptibility to pests and disease (Giller *et al,* 2011; Mpepereki *et al.,* 2000)

Therefore agronomic practices which are recommended for soybean production in Nigeria to include; site selection, land preparation, planting time, spacing and seed rate, fertilizer application, weed control, pest and disease control, harvest and storage. According to lronkwe *et al.* (2008) in production the technology has seven component practices as follows; (i) land preparation, {ii) use of mini sett dust or insecticide, (iii) time of planting (when the rains become steady) (iv) seed rate, Sett size (for yam 25g setts), (v) seed bed

preparation (vi) spacing and (vii) fertilizer.

1.2 Statement of the Problem

Soybean crop has replaced cotton and groundnuts as a cash crop production however it is still grown in subsistence level where the majority of farmers are smallholders with only 0.5 – 5ha of farmland. More over this category of farmers are producing in traditional way and lack much of the production and improved farming techniques.(ZASIDEP, 2004) With the existence of the Zamfara comprehensive agricultural revolution progamme given particular attention to small scale farmers to improve their agricultural growth but the effect of ZACAREP through the assessment of the channelled improve farming technology in producing this valuable has not been carried out lack of empirical data limits the basis for development programmes in respect to soybean crop in the state, this is one of the reasons that oblige the need for the study.

1.3 Objective of the Study

The main objective of this study was to assess the level of soybean farming/production covered by ZACAREP and profitability of soybean production in the study area

2.0 Methodology

2.1 The study area

The study was conducted in four of the fourteen Local Government Areas (LGAs) with the highest level of soybean production in Zamfara State. The selected LGAs were: Tsafe, Gusau, Maru and Bungudu. Zamfara State is located between latitude 10^040^1N – 13^040^1N and longitude 4^030^1E – 7^006^1E. The state has an estimated area of about 38,000km^2, about 50% of which is cultivated. It shares boundary with Sokoto state and the republic of

Niger to the north, Kebbi and Niger States to the west, Katsina State to the east, and Kaduna State to the South (ZMSG, 2001; ZMSG, 2016).

The mean annual rainfall ranges between 969 mm and 1,086 mm. Relative humidity varies between 24% in January and rises to 85% in September. The mean annual temperature also varies between 29^0C and 37^0C (ZMSG, 2016).The Sudan Savannah covers most of the northern and central parts of the State and is the predominant ecology of Zamfara State. The average annual precipitation in the Sudan region is between 550 and 900mm, while the growing period ranges between 90 to 165 days (ZMSG, 2001). The southern end of the state is typically Northern Guinea Savannah ecology, characterized by annual precipitation of more than 900mm and growing period of 150 days or more (ZMSG, 2001;Saddiq, 2012).

2.3 Sources of Data and Sampling Procedure

Respondents were selected randomly from the list of farmers covered by ZACAREP. A total of 2034 farmers were in the list of registered farmers used as sample frame out of which 600 were selected for the study. At this stage 29% was taken, as large sample is reasonable enough to give accurate data. The farmers composed of both participating farmers known in ZACAREP programme as (target farmers) and non-participating farmers. Target farmers are those that contributed or paid some percentage of cash deposit for a total loan package to have access to inputs, training, soybean demonstration plot, extension service etc, while the non-participating farmers, are farmers within the same registered association but register as only members of soybean farmers association.

Multistage random sampling technique was employed for the study. Bungudu Gusau, Maru and Tsafe local government areas (LGAs) were purposively selected for this study because of the good physical conditions of the soils and high concentration soybean farmers in the area. Four district from each local government were selected randomly and three villages from each district. These districts included: Bingi, Kwatarkwashi k/waje, and k/mota

in Bungudu LGA.   Mada, Magmi, Mayana and Wonaka in Gusau LGA, Dansadau, Y/Galadima, Bindin, and Maru in Maru LGA, Bilbis, Chediya, Keta, and Tsafe in Tsafe LGA.

Table 1: Distribution of respondents by LGA and Villages

LGA	Sample size	Number of Districts	Villages	Total
Bungudu	135	Bungudu	Gidan Dan Gwari	11
			Damba	11
			Kuga	11
		Kwatarkoshi	Tazame	11
			Gidan Jaki	12
			Sabon Gida	11
		Kuran Mota	Kango	11
			Rowan Mesa	11
			Kungurmi	11
		Kekun Waje	Gidan Saro	11
			Bingi	11
			Yar Katsina	11
Gusau	145	Mada	Mada	12
			Fegin Baza	12
			Rowan Bore	12
		Magami	Kunkelai	13
			Zonai	12
			Tofa	12
		Mayana	Kolo	12
			Yan Yashe	12
			Karal	12
		Wonaka	Lilo	12
			Ajja	12
			Wonaka Yamma	12
Maru	150	Maru	Kadauri	13
			Jabaka	13
			Lugga	13
		Bingi	Markau	13
			Dan Marke	13
			Bindin	13
		Dan Sadau	Mai Tukunya	12
			Yar Kura	12
			Dan sadau	12
		Yar Galadima	Kwakwaci	12
			Hannu tara	12
			Yar Tasha	12
Tsafe	170	Bilbis	Wanzamai	14
			Kucheri	14
			Unguwar Rogo	14
		Keta	Dan Jibga	14
			Nasarawa	14
			Kizara	14
			Magazawa	14
		Magazu	Gidan Giye	14
			Unguwar Chida	14

		Dan mane	14
	Chediya	Kware Kwabri	14
		Saukiya Dutse	16
TOTAL	600		600

Source: Field Survey, 2016

3.0 Data analysis

The analytical tool used in this study was descriptive statistics. Descriptive statistics was used to answer objective of this study the socio economic characteristics of the soybean farmers involved in the ZACAREP programme and assess the level of soybean farming/production covered by ZACAREP these involve such measures as frequencies, percentage minimum, and maximum, standard deviation to describe and present the result of the analysis Mustapha *et.al.* (2012) in his study employed descriptive statistics to summarize data percentages and frequencies.

The explicit form of the model was expressed as:

X_1 = Age of the respondents in years

X_2 = Sex: Sexes of Soybean Farmers was either male or female.

X_3 = Level of Education.

X_4 = marital status: marital status of the respondents was assessed as married and single.

X_5 = Household size (number of persons in the house)

X_6 = years in ZACAREP programme measured in years

X_7 = Sources of labour: this was measured in reliance on hired labour or family labour.

X_8 = Farming experience of the respondents in years of soybean production.

X_9 = farmers' farm size measured in hectares

$X_{10} = =$ Membership in soybean cooperative farmers group/association.

4.0 Results and Discussion

The major focus was on the discussions of the farmer's characteristics as they vary between participating and non-participating farmers on the selected recommended farming technologies and improved practices for soybean production. The findings in respect of socio- economic status, soybean production level by ZACAREP, and Many studies have shown that the socio-economic status of farmers was positively related to the adoption of improved practices the socio-economic characteristics of the respondents were examined with respect to their sex, marital status, age, farm size, household size level of education, primary occupation, source of labour and farming experience.

4.1 Socio- economic Characteristics of the Soybean Farmers

The majority 96%of the farmers were young and middle age group. This implies that the farmers are still in their economically active age that can make positive contribution. This conforms to the report of Amaza *et al.* (2007). That most of the Nigerian farmers were between 30 and 50 years of age. In addition According to Mbanasor and Kalu (2008), age has a positive and significant relationship with a farmer's economic efficiency. The result further showed that the mean age for the participation farmer was 47.8 years while that of non-participating farmer was 47.18 years the majority of the participating farmers and non-participating farmers were engaging in farming and produce Soybean. This confirms the report by ZADP (2009) Zamfara state whose slogan is "farming is our pride" figure of 3, 278, 87 (NPC, 2006). About 82% of the population live in the rural areas and depend on agriculture to varying degrees for their live hood. This may also imply that the price of soybean is higher than other food and cash crops and more importantly it was produced as

food and cash crops. The soybean production has replaced other crops and became very profitable occupation as compared to other crops (Cotton, Groundnut, Sesame, vegetables) and a source of income for the most farmers in these local governments. This conforms to Bush and Noura (2012) low international prices which have affected cotton production in particular. Prices are low enough for farmers to consider shifting to soybean as a replacement of cash crop another factor is farmers in the zone are increasingly planting soybeans to replace groundnuts as a cash crop because of two advantages at present. The current selling price of soybeans favours producers and the crop also does not need much fertilizer.

4.1.2 Production technologies used by farmers under ZACAREP

The activities covered include seed used, seed treatment, chemical used for seed treatment, planting date, cropping system planting method, spacing, weed control, fertilizer application, type of fertilizer used, time of application ,pest observed, type of damage by insect noticed at flowering, spray insect, and treat seed when stored.

4.1.3 Seed used

The level of activities covered by ZACAREP in soybean production by participating and non-participating farmers in the study area was analyzed, from the result on table 3 shows that majority of the farmers cultivated improved soybean. 31.6% and 30.4% participating and non-participating farmers were found to have cultivated improved soybean. Others 36.6% and 16.4% were found to have cultivated local variety, those that cultivated early maturing varieties indicated 24.0%, and 5.6% and drought resistant varieties 27.6%, and 32.4% respectively. This implies that Soybean variety selection should be based on maturity, yield potential, lodging, drought tolerance, and resistance to pests and diseases for the farmers may use to grow soybean profitably. Indicated from the result on table 3 that majority of the participating and non-participating farmers cultivated improved soybean may be choice of the right variety is necessary due to the climatic condition of the study area. This

agreed with report by Dugje *et al.* (2009) that selected soybean varieties grown were made available in Nigeria. Choose a variety suited to your agro ecological zone. Soybean variety selection should be based on maturity, yield potential, lodging, drought tolerance, and resistance to pests and diseases.

4.1.4 Seed treatment

The study revealed that the participating and non-participating farmers adopted the technologies by ZACAREP. Majority of the farmers 98.8% and 96.4% treated seeds before planting to prevent pest and diseases attack. Protection of Soybean against soil borne fungal diseases may result into vigour growth and good seedlings to emergence. Chemical called apron plus recommended by ZACAREP. The use of apron plus by the majority of the respondents was by the recommendation of ZACAREP because it serves insecticide and fungicides, which agreed with Adekunle *et al.* (2012) treat seeds with Apron plus at the rate of 10 g/4 kg of seeds to prevent seeds from being damaged by insects and fungi prior to and soon after germination.

4.1.5 Chemical used for seed treatment

Majority (94.4% and 92%) of the participating and non-participating farmers were indicted to have treated their seed with the seed dressing chemical called apron plus recommended by ZACAREP. 3.2% of both category of farmers used captain seed dressing chemical. While few of the respondents 0 .8% and 1.6 % indicated to have used Fanasan D 1.6% and 2.0% of the category farmers respectively used D Force seed dressing chemical. The use of apron plus by the majority of the respondents was by the recommendation of ZACAREP because this type of seed dressing chemical serves as insecticide and fungicides. Majority of farmers treated their seed with the seed dressing chemical called apron plus recommended by ZACAREP which agrees with Adekunle *et al.* (2012) treat seeds with

Apron plus at the rate of 10 g/4 kg of seeds to prevent seeds from being damaged by insects and fungi prior to and soon after germination.

4.1.6 Planting date

Soybean produces well over a wide range of planting dates, if moisture is available. In the study area rain were first established in May but well established in the month of June for good germination of soybean it is recommended to plant when there is ample moisture. Majority (61.2% and 53.2%) of the participating and non-participating farmers planted soybean early June, about 15.2% and 17.2% of the farmers planted soybean in late June. Table 3 revealed that majority of the participating and non-participating farmers planted soybean early June. This agreed with Dugje *et al.* (2009) who revealed that recommended dates for planting soybean in different ecological zones in Nigeria as follows: Moist savanna/southern Guinea savanna Early June–early July Northern Guinea savanna–Sudan savanna Mid-June–early July Sudan savanna July, weeks 1–2 because a prolonged dry spell after planting may result in permanent wilting of the crop and the need for replanting. Late planting, on the other hand, may expose the crop to attack by some late season pests.

4.1.7 Cropping system

Table 3: revealed that 28.0% and 33.2% of the participating and non-participating farmers practiced sole cropping while 20.4% and 26% to practiced intercropping. The finding further revealed that 51.6% and 40.8% accounted for both practices. Intercropping provides for the cereal crop benefit of nitrogen fixed by soybean crop in the soil. Furthermore table 3 shows that majority of the participating and non-participating farmers planted either sole or intercropping that is done in order for their cereal crop to benefit from nitrogen fixed by soybean crop. A population of 250,000 to 400,000 plants per hectare is generally recommended, depending on the yield potential of the area. The higher the yield potential of

the area, the higher becomes the plant population. This agrees with Adekunle *et al.* (2012) the soybean grows best when planted as a mono crop. However, when intercropped, plant component crops, especially cereals, in such a way as to minimize shading. Plant 4-5 rows of Soybean alternated with 3-4 rows of cereals.

4.1.8 Planting method

Table 3: revealed that 16.2% and 17.6% of the participating and non-participating farmers used broadcasting method of planting soybean. Drilling method of soybean cultivation constituted 47.2% and 37.2% of the participating and non-participating farmers While, spot planting accounted for 19.65% and 24.8% of the farmers respectively. Double row spacing also constituted 16.4% and 20.4% of the respondents. The finding shows that Drilling method of soybean cultivation carried the highest percentage. The practices were done by farmers in order to obtain the maximum yield per hectare this planting method determines plant population, crop yield and good response by some varieties. A wide range of land preparation systems are used in different agro-ecological regions of tropical Africa. In the study table 3 shows that spot planting, double row spacing, and drilling method were used but majority of the participating and non-participating farmers used drilling method. The planting method determines plant population, crop yield and good response by some varieties, as revealed by Dugje *et al.* (2009) drill seeds at 50–75 cm between rows and 5 cm within rows. For the early maturing varieties, a spacing of 50 cm between rows and 5–10 cm within rows is recommended because they respond better to narrow spacing than the late-maturing varieties.

4.2.9 Spacing

The result in Table 3 revealed Majority (86.4% and 82%) of participating and non-participating farmers planted at 75cmx10cm. Others that drill seeds at 50 -75 cmx5cm accounted for 0.8% and 2.0% of the farmers. Those that planted at 75cmx 15cm were found

to be 2.4% and4.8% of the farmers. Spacing at 50 cm between rows indicated 9.6% and 10.4% of the farmers respectively. Few of the participating and non-participating farmers accounted for 0.8% and 0.8% respectively. The findings indicated that spacing of soybean depended on the variety selected by the farmer. Different spacing was required for soybean production as supported by Dugje *et al.* (2009) Plant 3 - 4 seeds per hole at a spacing of 75 cm between rows and 10 cm between stands. Alternatively, drill seeds at 50–75 cm between rows and 5 cm within rows. For the early maturing varieties, a spacing of 50 cm between rows and 5–10 cm within rows is recommended because they respond better to narrow spacing than the late-maturing varieties. Do not sow seeds more than 2–5 cm deep. Deeper planting may result in loss of vigour or failure of seedlings to emerge.

4.2.10 Weed control

Weed control in the study area is done manually or by chemical or both because of early emergence of grass at the beginning of rainy season. From the result on table 3 indicated 69.2% and 78% of participating and non-participating farmers used hand weeding on soybean cultivation. Those that used chemical weed control accounted for 30.8% and 22.0% respectively. Inadequate and high cost of labour at critical weeding period was one of the factors affecting rate of adoption of recommended weed control among soybean farmers. Thus majority of the participating and non-participating farmers 'in the study area control weed manually or by chemical or both because of early emergence of grass at the beginning of rainy season. Dugje *et al.* (2009) perennial and most annual weeds are a problem in soybean in its early growth stages. A properly timed weed control program can minimize the effects of weeds. DAFF (2010).Weeds can reduce yield, the degree of depression being related to the quantity of weeds and the growth stage of the crop. Young seedlings are unable to compete with many fast-growing weeds and their control at this stage is very important.

Weeds usually have a fast growth rate and can easily deprive the soybean plant of moisture, minerals and light during the early growth stage.

4.2.11 Fertilizer application

From the result likewise on Table 4 revealed that majority (97.6% and 94.8%) of the participating and non-participating farmers applied fertilizer on their soybean as a starter dose. However 2.4% and 5.2% of respondents were found not used fertilizer on their cultivated soybean crop. Majority of soybean farmers were small scale, they used organic manure to improve the fertility of their farm. Fertilizer is any material, organic or inorganic, natural or synthetic that furnishes to plants one or more of the chemical elements necessary for normal growth. The result in table 4 thus revealed that majority of the participating and non-participating farmers' applied fertilizer in soybean production. IITA, (2010) the large quantities of natural organic fertilizer materials (plants or animal in origin) are still used in many parts of the world. These include animal and human excreta, ashes, sewage, slaughter-house wastes, fish scrap, and oil-seed meals. Their advantages are to (1) supply nutrients directly, (2) Stimulate desirable biological activity in the soil, and (3) is improve soil structure. Their disadvantages are (1) seldom available locally in large quantities; (2) large-scale collection and distribution are uneconomical, (3) non-uniform composition, and (4) unfavourable physical condition. Some of these disadvantages can be overcome by simple processing such as drying, pel1eting and enrichment with synthetic fertilizers.

4.2.12 Type of fertilizer used

From the Table 4 the result revealed that majority (89.6% and 82.4%) of the farmers used both organic and inorganic fertilizers on their soybean farm lands, while 2.8% and 5.6% applied only organic fertilizer. Similarly 7.6% and 12.0% of the farmers applied only inorganic fertilizer to their soybean crop, the unavailability of inorganic

fertilizers and nature of the soil make it necessary for farmers in the study area to use the both fertilizers in order to improve their soil fertility. Farmers used the combination of compost, farm yard manure and poultry manure to soybean farm land to improve their soil condition. The findings concluded participating farmers used both organic and inorganic fertilizers on their soybean farm lands, Dugje *et al.* (2009). A good fertilizer recommendation for soybean production depends on a good soil test. Under normal conditions, soybean as a legume should provide itself with nitrogen through biological nitrogen fixation. Until nodulation occurs, the soybean plant depends on soil nitrogen for growth. Phosphorus is often the most deficient nutrient; therefore, Dugje *et al.* (2012) further said, apply optimum phosphorous fertilizer for good yield. Apply phosphorus at the rate of 30 kg p/ha in the form of single super phosphate fertilizer (SUPA) (3×50 kg bags) in addition to 2½ $\times$ 50 kg bags of compound fertilizer NPK 15:15:15. Nitrogen and potassium fertilizers are needed only when there are obvious deficiencies. Incorporate the fertilizer into the soil at land preparation during harrowing and levelling the field.

4.2 .13 Inorganic fertilizer used

Table 4 further revealed that 52.0% and 61.6% of the participating and non-participating farmers use compound fertilizer (NPK). Those that used phosphate fertilizer accounted for 0.8% and 0.4% respectively. However soybean farmers who applied a combination of NPK and SSP accounted for 4.8% and 8.4%.Others used the combination of NPK and UREA accounted for 42.4% and 29.6% this reason follows because of intercropping soybean with cereal crops. Majority of the participating farmers' and non-participating farmers in the study area used compound fertilizer (NPK). It was recommended to apply 3 bags/hectare of NPK 15:15:15 and one bag of single superphosphate/hectare (ZASIDEP, 2004) Others used the combination of NPK and UREA accounted for 42.4% and 29.6% this reason follows because of intercropping soybean with cereal crops. In the

traditional Soybean growing areas, it is most commonly intercropped with cereal crops like maize, sorghum and millet (Adeniyan and Ayoola, 2006).

4.2.14 Types organic fertilizer applied

The result in Table 4 shows that also 12.0% and 16.0% of the participating and non-participating farmers used compost and 30.8% and 41.2% applied farm yard manure on their soybean farm lands. Similarly 13.6% and 12.0% of the farmers used poultry manure. However 43.6% and 30.8% of the farmers used combined the three types of organic fertilizer. Organic Fertilizer is incorporate into the soil at land preparation during harrowing and leveling the field to allow even mixture. Both category of farmers used organic fertilizer because of nature of soil in the study area. Soybean growth is influenced by climate and soil characteristics. Nitrogen and potassium fertilizers are needed only when there are obvious deficiencies. Incorporate the fertilizer into the soil at land preparation during harrowing and leveling the field (Dugje *et al.,* 2009).The result of the finding further revealed that traditionally farmers were found to always apply farm yard manure on their farm to supplement the soil with required nutrients by the plants because the soil in this area face a lot of threat ranging from deforestation for domestic fuel, overgrazing by livestock and agricultural practices that fail to conserve soils.

4.2.15 Time of fertilizer application

Time of fertilizer application is very important so as to give the soya been a starter dose in the case of soil with nutrient deficiency. The study on table 4 shows 49.6% of the participating and 50.8% of non-participating farmers applied fertilizer appropriately at three leave vegetative stage to enhance efficient use of fertilizer. The remaining 26.4% and 20% of the farmers applied fertilizers before planting. It was expected to incorporate organic fertilizer in the soil before planting and at the time of ploughing or harrowing. The participating farmers and non-participating farmers applied fertilizer appropriately at three

leave vegetative stage to enhance efficient use of fertilizer Time of fertilizer application is very important to soybean serve as a starter dose in the case soil with nutrient deficiency. This agrees with the report Dugje *et al.* (2009) who opined that Nitrogen and Potassium fertilizers are needed only when there are obvious deficiencies. It is always required to incorporate organic fertilizer in the soil before planting and at the time when ploughing or harrowing.

4.2.16 Pest observed

Table 4 likewise shows the participating and non-participating farmers which constituted 10.4% and 12.4% did not observed any pest on their soybean crop. But majority (89.6% and 87.6%) of the farmers observed pest on their soybean farm lands. The findings also revealed that several different insects occur in soybean fields especially caterpillars at the vegetative stage. This agrees with the report of Dugje *et al.* (2009), several different insects occur in soybean fields but few are normally of any economic importance, and the species that cause damage are usually not abundant enough to warrant control measures. The vegetative stage, the crop is very tolerant of caterpillars but very susceptible to silver leaf whitefly attack.

4.2.17 Type of damage by insect

The result in table 4 revealed that 5.4% and 50.8% of the participating and non participating farmers' observed insect damages on their soybean leaves. Others farmer found to account for 2.4% and 2.8% observed insect damages on the plant pods. However 47.2% and 46.4% of the farmers experienced both attack on their soybean plant. From the result of study implies that damages were usually not abundant enough to warrant control measures. This report agrees with Adekunle *et al.* (2012) that in Nigeria insect pests are not a serious problem for now, but could be serious in future as hectares of soybean cultivation increases under mono-cropping control.

4.2.18 Noticed pest at flowering

The result in table 4 shows that majority (90.4% and 87.6%) of the participating and non-participating farmers noticed pest at flowering stage. While others about 9.6% and 12.4% of the farmers showed that they did not observed any pest at flowering stage on their crop. Thus farmers observed pest attack on their soybean flowers unlike other soy bean plant parts as supported by Dugje *et al.*(2009), indicted from flowering onwards, soybean becomes attractive to pod-sucking bugs that can seriously reduce seed quality.

4.2.19 Spray insect

Table 4 likewise revealed that 54% each of the participating and non-participating farmers sprayed their crop against insect. While 46% each of the categories shows that they do not spray against any insect. This may imply that farmers sprayed soybean against insect pests and diseases that could seriously reduce seed quality and yield. It was revealed from the result of the finding most of the participating and non-participating farmers that observed pest do spray their soybean crop to prevent damage and yield reduction. Insect pests can be controlled with a single spray of Cypermethrin + Dimethoate 10 EC at the rate of 100 mL in 15 L of water (Dugje *et al.,* 2009).

4.2.19 Treat seed when stored

The table 4 also revealed that 31.6% and 29.2% of the participating and non-participating farmers used postoxin to store their soybean seeds, while 27.6% and 19.2% of the farmers used acetylic on storage of their soybean seeds. Those who used other methods accounted for 1.6% and 3.2% of the farmers respectively. However, 39.2% and 48.4% did not use any chemical treatment in storage of their soybean seeds it was revealed that most of the farmer does not treat their seeds with storage chemical, this agreed with the report of DAFF (2010). Soybean can be stored for a long period without fumigation. Owing to the inherent growth inhibitor in raw soybeans, insects are not inclined to attack them. Care must be taken

to ensure that moisture does not converge, because it may lead to combustion. Air movement through the grain volume is useful to maintain a low temperature.

5.0 Conclusion

The study assessed the effect of the Zamfara Agricultural Comprehensive Revolution Programme (ZACAREP) on Soybean Production. Information was obtained from both participating and non-participating farmers. The socio-economic characteristics of the farmers were determined, the study sought to provide information on the level of production. The result of this study indicated that most of the soybean farmers were male and middle aged with relatively large household. They cultivated less than five hectares and are categorised as small scale farmers. The study showed that most of the farmers had farming experience in soybean production and were members of soybean farmers' cooperative society. Majority of the farmers used improved seeds sourced from ZACAREP, ADP and Ministry of Agriculture. Farmers also used combination of both organic and inorganic fertilizer on soybean production. It was evident that from this study these farmers applied fertilizer after three leaves vegetative stage. Farmers treated their seeds with seed dressing chemical before planting and most of them acknowledged the presence of insects on their crop sprayed insecticide to control their attack.

6.0 Recommendations

Based on the findings of this study, the following recommendations were made:

i. Farmers should be encouraged to access formal training so that they form viable corporative societies to enable them participates in development programme.

ii. Government should fully involve women in extension work in the area of the study so as to assist, train women on improved farming technology in soybean production.

iii. Soybean production attracts profit; famers should be mobilized by the state government to participate to increase large scale production for foreign exchange earnings.

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Table 2: Distribution of respondents by socio-economic characteristics

Variables	Category	Participating farmer		Non-Participating farmer	
		Frequency	Percentage	Frequency	Percentage
Age	<30	8	3.2	10	4.0
	31-40	41	16.4	48	19.2
	41-50	128	51.2	113	45.2
	51-60	73	29.2	74	29.6
	>60			5	2.0
	Mean		47.80		47.18
	Std. Deviation		6.940		7.782
	Std. Error		0 .439		0.492
Gender	Male	204	81.6	219	87.6
	Female	46	18.4	31	12.4
Education	Non formal	3	1.2	16	6.4
	Primary	167	66.8	125	50
	Secondary	50	20	71	28.4
	Tertiary	30	12	37	14.8
	Others			1	0.4
Marital status	Single	3	1.2	2	0,8
	Married	235	94	241	96.4
Household size	1-5	50	20	89	35.6
	6-10	128	51.2	115	46
	11-15	54	21.6	34	13.6
	>15	18	7.2	12	4.8
Occupation	Farming	121	48.4	111	44.4
	Civil Servant	9	3.6	22	8.8
	Artisan	7	2.8	6	2.4
	Farming and Civil Servant	45	18	42	16.8
	Farming and Trading	68	27.2	69	27.6
Farm size	0-2	63	25.2	55	22
	1-3	77	30.8	89	35.6
	1-4	61	24.4	52	20.8
	1-5	49	19.6	54	21.6
	Mean	3.193		3.246	
	Std. Deviation		1.033		1.021
	Std. Error		0.065		0.064
Labour source	Family labour	1	4	13	5.2
	Hired labour	22	8.8	49	19.6
	Both labour	227	90.8	188	75.2
Years/ experience	<10	67	26.6	225	90.
	11-20	166	66.4	10	4.0

21-30	19	7	11	5.64
<30				
Mean		10.66		0.00
Std. Deviation		2.410		0.000
Std. Error		0.152		0.000

Source: Field data survey, 2016

Table 3: Distribution of participating and non-participating farmers based on Level of farming activities covered by ZACAREP

Variables	Participating farmer		Non-Participating farmer	
	Frequency	Percentage	Frequency	Percentage
Seed				
Improved	79	31.6	76	30.4
Local	34	13.6	41	16.4
Large/Medium	8	3.2	15	6
Early Maturing	60	24.0	37	14.8
Drought tolerant crop	60	27.6	81	32.4
Seed treatment				
Yes	247	98.8	241	96.4
No	3	1.2	9	3.6
Chemical used for seed treatment				
Apron plus	236	94.4	230	92.0
Captan	8	3.2	8	3.2
Fanasan D.	2	0.8	4	1.6
D Force	4	1.6	5	2.0
Wood ash			3	1.2
Planting date				
Early June	153	61.2	133	53.2
Late June	38	15.2	43	17.2
Early July	59	23.6	74	29.6
Cropping system				
Sole Cropping	70	28	83	33.2
Intercropping	51	20.4	65	26
Both	129	51.6	102	40.8
Planting method				
Broadcasting	42	16.8	44	17.6
Drilling	118	47.2	93	37.2
Spot Planting	49	19.6	62	24.8
Double row Planting	41	16.4	51	20.4
Spacing				
75cm x 10cm	216	86.4	205	82
Drill seeds at 50 -75cmm x5cm	2	0.8	5	2
75cm x 15cm	6	2.4	12	4.8
50 cm between rows	24	9.6	26	10.4
5 - 10cm within rows	2	0.8	2	0 .8
Weed control				

Hand weeding	173	69.2	195	78
Chemical weeding	77	30.8	55	22

Source: Field data survey, 2016

Table 4: Distribution of participating and non-participating farmers based on level of farming activities covered by ZACAREP

	Participating farmer		Non-Participating farmer	
Variables	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Fertilizer application				
No	6	2.4	13	5.2
Yes	244	97.6	237	94.8
Type of fertilizer used				
Organic	7	2.8	14	5.6
Inorganic	19	7.6	30	12
Both	224	89.6	206	82.4
Inorganic used				
NPK	130	52	154	61.6
SSP	2	0 .8	1	0 .4
NPK and SSP	12	4.8	21	8.4
NPK and Urea	106	42.4	74	29.6
Organic applied				
Compost	30	12	40	16
Farm Yard Manure	77	30.8	103	41.2
Poultry manure	34	13.6	30	12
Tine of fertilizer application				
Before Planting	66	26.4	50	20
After 3 Leaves Stage	124	49.6	127	50.8
At Full Vegetative stage	60	24	73	29.2
Pest observed				
No	26	10.4	31	12.4
Yes	224	89.6	219	87.6
Type of damage by insect				
Eat Leaves	126	50.4	127	50.8
Suck the plant Pod	6	2.4	7	2.8
Both	118	47.2	116	46.4
Noticed Pest At flowering				
No	24	9.6	31	12.4
Yes	226	90.4	219	87.6
Spray insect				
No	115	46	135	46
Yes	135	54	115	54
Treat seeds when stored				

postoxin	79	31.6	73	29.2
Acetelic	69	27.6	48	19.2
Others	4	1.6	8	3.2
None	98	39.2	121	48.4

Source: Field data survey, 2016.