Adoption of Sassakawa Global 2000 Maize Production Practices:

A case study of Yelwa Area of Bauchi Local Government Area of Bauchi State, Nigeria

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Abstract

A study was carried out in November, 2014 to determine the adoption of Sassakawa Global 2000 Maize production practices in Yelwa Area of Bauchi local Government Area of Bauchi state. Two hundred (200) questionnaires were proportionately distributed among the six (6) villages in Yelwa Area, namely Yelwa Lebura/Tudu, Birshi-Fulani, Lushi, Sabon Kaura, Gwallameji and Kagadama. One hundred and ninety two questionnaires were filled and returned and were analyzed using simple frequency and percentages. The study revealed among others that most farmers in the study area that adopted the technology were in their active and productive ages and some of them had one form of education or the other which enhanced them to adopt and practiced the technology a bit easier. It is also an indication that maize production has a promising future in the study area. Extension agents contributed meaningfully towards the success recorded in Sassakawa Global 2000 in the study area not only by taking the innovation to the farmers but also in linking them up to source of good seed. Overall result indicated a good percentage yield increase as a result of adoption of SG 2000 compared to the existing traditional method of maize production in the study area. It is therefore recommended among other things that more training, workshop and meeting should be organized by relevant bodies like Agricultural Development Programme for the farmers in the study area and the state as a whole to enlighten farmers on the true application of the agronomic principles of Sasakawa technology such as early planting, incorporation of fertilizer into the soil, early weeding, disease/pest control, proper spacing and correct plant population. Land acquisition should be made easy for people who want to engage in farming. Farm inputs should be provided at affordable prices for the farmers.

Key words: Sassakawa Global 2000 (SG 2000), Adoption, Performance

Introduction

More than any other regions of the world, African food production is in crisis. High rates of population growth and little application of improved production technology during the last two decades resulted in declining per capita food production, escalating food deficits, deteriorating nutritional levels, especially among the rural poor, and devastating environmental degradation. Sub-Sahara Africa's extreme poverty, poor soils, uncertain rainfall, increasing population pressures, changing ownership patterns for land and cattle, political and social turmoil, shortages of trained agriculturalists, and weaknesses in research and technology delivery system all make the task of agricultural development more difficult (Norman, 2007).

The index of total agricultural production in Nigeria, as derived by the Central Bank of Nigeria with 1975 as a base, has witnessed a significant down-turn since 1970, between 1970 and 1974, the index recorded an average increase of 4.5% per annum. But, between 1975 and 1979, it showed an average decline of 5.6% and achieves some firmness between 1980 and 1983, when it recorded an average decline or only 0.1% per unit per annum. Staple crop production which accounts for about 50% of the total value of agricultural production recorded a more unsatisfactory performance (Ajakaiye, 1983).

Maize is widely cultivated throughout the world, and a greater weight of maize is produced each year than any grain. Worldwide production was around 800 million tonnes in 2007 – just slightly more than rice (about 650 million tonnes) or wheat (about 600 million tonnes). In 2007, over 150 million hectares of maize were planted worldwide, with a yield of 4970.9 kilogram/hectare. Production can be significantly higher in certain regions of the world (Cedar, 2009). Meanwhile, according to Duvick and Cassman (1999), there is conflicting evidence to support the hypothesis that maize yield potential has increased over the past few decades.

One effective way to increase agricultural productivity is through wider adoption of new farming technologies (Minten and Barrett, 2008). The adoption of new technologies, such as fertilizer, improved seed, etc. is central to agricultural growth and poverty reduction efforts. For instance, a study in Mexico showed that adoption of improved maize varieties improves household welfare (Becerril and Abdullai, 2010). Similarly, in sub-Saharan Africa, adoption of improved maize was indicated to have positive outcomes (Alene *et al.*, 2009).

Sasakawa Global 2000

Agricultural projects of SG 2000 are operated as joint ventures of two organizations-Sasakawa Africa Association (SAA) and the Global 2000 programme of the Carter Centre in Atlanta (CCA). SAA, whose president is Dr. Norman E. Borlaug, serves as the lead management organization for the SG 2000 projects in Africa. Over the past 23 years, the Sasakawa Africa Association (SAA) and its partner, the Global 2000 program of the Carter Centre in Atlanta, have worked-under the name SG 2000 – with tens of thousands of frontline extension workers and several million farmers in 14 sub-Sahara Africa countries. The main focus of that project was to test and promote higher-yielding technology for maize, wheat, rice, grain legumes, and roots and tubers production. The new technologies promoted by SG 2000 programs were developed by African National Research Organization in collaboration with the International Agricultural Research Centers. SG 2000's role has been a catalytic one, working primarily with national ministries of agriculture to mount dynamic field demonstration programs so that farmers can evaluate for themselves the value of these improved technologies. Nigeria was one

of the four countries selected to keep on hosting SG 2000 programme since inception (Sasakawa Africa Association, 2007).

Sasakawa Global 2000 is a production technology that is set to achieve, among other things, the following: the use of the best available commercial varieties or hybrids, proper land preparation and seeding to achieve good stand establishment, proper application of the appropriate fertilizers and, when needed, crop protection chemicals, timely weed control, and moisture conservation and/or better water use if under irrigation (Sasakawa African Association, 2007).

The SG 2000 project in Nigeria began in 1992 in collaboration with the Federal Ministry of Agriculture and Natural Resources and the Agricultural Development Programmes (ADPs) of two Northern States – Kano and Kaduna. The chief objective was to rapidly introduce improved technologies in wheat and maize in Northern Nigeria. The principal tool for the demonstration is the Management Training Plot (MTP), a farmer's field of a quarter to a half hectare in which the farmer practices the full technological package SG 2000 recommends. Technology recommended in the maize MTP calls for less use of fertilizer than had been common in the period when Nigeria subsidized fertilizer, but with better timing and a method of application, thus reducing costs. SG 2000's reach had been extended across nine states which are: Bauchi, Gombe, Adamawa, Kano, Kaduna, Jigawa Kebbi, Sokoto and Zamfara, it also continued to expand its partnerships with other organization. Among the collaborative activities were: the promotion of the fungicide seed dressing, Apron Star, to control downy mildew in millet, with Novartis; fertilizer demonstrations in cotton and cowpea with Dan-Hydro; and the demonstration of new maize hybrids with premier seeds. SG 2000 was involved with state ministries of agriculture in promoting input marketing, demonstrations of new wheat varieties with the Lake Chad Research Institute (LCRI), and post harvest training for extension agents and farmers with the National Stored Products Research Institute (NSPRI) (Sasakawa Africa Association, 2007).

SG 2000 has received many requests to extend its crop-based technology transfer approach to all the 36 states of the federation. In 2001, in addition to its 9 operational states, SG 2000 conducted training in Borno, Cross-River, Nassarawa and Ogun States. There is increasing support for the consolidation and expansion of SG 2000 activities and also in laying a foundation for its sustainability. A prime example is Bauchi State, where some 10,000 frontline extension agents and farmers were trained and provided with loan packages for inputs during the 2003 season (Sasakawa African Association, 2007).

Objectives of the study

The objectives of this study were to:

(a) determine the level of adoption of Sasakawa Global 2000 maize production practices among farmers in the study area,

(b) evaluate the performance of Sasakawa Global 2000 compared to the existing method of maize production.

The study area

The study was carried out in Yelwa District of Bauchi Local Government Area of Bauchi State. The area was considered for the study because majority of the farmers in the area were maize

farmers. Yelwa has six wards, namely; Yelwa Lebura/Tudu, Birshi Fulani, Lushi, Sabon Kaura, Gwalameji and Kagadama. Bauchi State is located between latitude 93^0 and 12^0 30^1 and longitude 8^0 5^1 and 11^0 East. The state has a population of 3.4 million people and 332,000 farming families. Extension agent – farm families ratio is 1:1100 and over 70% of the working population has farming as their main occupation. The total land area is 484,000 sq/km, of which 85% is cultivable, but only 1,200 sq/km (25%) is actually under cultivation. (SG 2000 Activities in Bauchi State, 2005).

Problem Statements

A few of the problems associated with maize farmers in the study area and to a greater extent in Bauchi State are small farm size, low income earning, increasing soil degradation and soil erosion, increasing costs of farm inputs, high cost of large farm machinery/little access to credit facilities, little or no access to more simple and affordable machinery and equipment (The Nation Newspaper, 2009).

Methodology

Two hundred structured questionnaires were distributed among male farmers of different ages (both young and old) in all the six wards of Yelwa to collect data for the study. The list of registered farmers under SG 2000 was collected from Bauchi State Agricultural Development Programme and proportionate sampling was used by allocating questionnaire proportionate to 40% of the number of the registered farmers in each of the wards. Fifty (50) questionnaires were distributed in Yelwa Lebura/Tudu, forty (40) in Gwallameji ward, thirty five (35) were distributed in Birshin Fulani, twenty five (25) in Lushi, thirty (30) in Sabon-Kaura and twenty (20) questionnaires in Kagadama ward. Some of the farmers were able to fill the questionnaires themselves while others that were not literate were interviewed and were assisted in filling the questionnaires. One hundred and ninety two questionnaires were duly filled and returned, the data generated were analyzed using simple frequency and percentages.

Results and discussion

Table 1: Distribution of Respondents on socio-economic characteristics

Variables	Frequency	Percentage
Age		
21 – 30	20	10.4
31 – 40	48	25.0
41 – 50	70	36.5
51 – 60	44	22.9
>60	10	5.2
Total	192	100
Marital status		
Single	10	5.2
Married	164	85.4
Divorced	4	2.1
Separated	4	2.1
Widow	10	5.2
Total	192	100
Education		
Illiterate	78	40.6
Primary education	50	26.0
Adult education	38	19.8
Secondary education	18	9.4
Tertiary education	8	4.2
Total	192	100
Number of children		
1 – 5	60	31.3
6 – 10	76	39.6

11 – 15	38	19.8
>15	18	9.3
Total	192	100

Table 1 showed that 36.5% of the respondents were between 41 – 50 years of age, while 25% were between 31 – 40 years. About 22.9% were between 41 – 60 years and 10.4% were between 21 – 30 years while 5% were more elderly, aged more than 60 years. As shown here, youth aged 21 – 30 years were only 10.4% of the respondents which is in consistent with the results of previous study of Simorgan and Arokoyo (2001) which stated that youths generally detested farming as a profession. Though, the result of the study still revealed that majority (138), that is 71.0% of the farmers were in their active productive years which implies that they can easily adopt and take part in any progressive activities, in this case, SG 2000.

Majority (85.4%) of the farmers were married; this must have had positive impact on their farming activities as per lending helping hands on the farm. Also 2.1% each were divorced and separated and 5.2% each were single and widow.

The educational status of the respondents as shown in this study indicated that most (59.4%) of the farmers in the study area had one form of education or the other (ranging from primary to tertiary education) which possibly enhance their easy adoption of SG 2000. This is in line with Agbamu, (1993) that educated farmers are more likely to adopt innovation than non-educated ones. And also Njoku (1991) and Okunmadewa (2002) in a separate studies found that formal education has a positive influence on adoption of innovation. Meanwhile, in the report of Oladejo and Oyesola (2000), though education is an important factor in the acceptance of the innovation, nevertheless, farmers that have considerable years of farming experience normally have good rapport with extension agents will accept innovations irrespective of their education background.

Another socio-economic factor of the respondents as shown in table above is the number of children of the farmers in the study area. It was shown that 39.6% had children between 6 and 10 and 31.3% of the farmers had 1 – 5 children. Meanwhile, 19.8% had children between 11 and 15 and 9.3% had more than 15 children. Household size could be an important factor in the adoption of Sasakawa, Global 2000 Maize Production technology considering the tasks involve in agronomic activities of SG 2000 on the field including method of planting one seed per hole and seemingly fertilizer application methods of making of a hole of about 3-5cm deep in between the plant stands and the subsequent covering of the hole. It will therefore be easier for a relatively larger household size to adopt the technology. This is in agreement with the reports of Motuma *et al*., (2010) that increase in family size positively influences, through increases in the availability of labor, the decision to adopt improved maize varieties.

Table 2: Distribution of respondents according to their occupation

Occupation	Frequency	Percentage
Civil servant	54	28.1
Non – civil servant	138	71.9
Total	192	100

The result indicated that low (28.1%) respondents, in addition to being farmers, were civil servant while majority (71.9%) depended solely on farming as their only occupation.

Table 3: Source of awareness that enhance adoption of SG 2000

Sources of awareness	Frequency	Percentage
Through extension agent only	120	62.5
Through media and extension agent	44	22.9
Through media only	28	14.6
Total	192	100

Majority (62.5%) of the farmers claimed that the innovation got to them through the extension officers, while 22.9% of the respondents attributed their awareness of the programme to the combining efforts of extension agents and media and 14% said that media is their source of awareness. It can be deduced from this result that extension agents concentrate mainly on the rural farmers than those in the offices. According to Obinne (1991), the role of the extension agent in technological transfer is of great importance to the sustenance of viable technology.

Table 4: Distribution of respondents according to reasons for adopting SG 2000

Reasons for adopting SG 2000	Frequency	Percentage
High yielding	136	70.8
Low cost of operation	56	29.2
Total	192	100

The table above showed that majority (70.8%) of the respondents adopted SG 2000 technology because of its high yielding ability while 29.2% adopted the technology because of its low cost of operation, which include weeding. For a technology to be adopted, as opined by Sanginga (1998), a minimum necessary condition is that it lowers the total cost of producing unit of output. Higher returns are an important factor on adopting a new technology. Also, Ulmali (1972), concluded that for a farmer to adopt a new practice, he must perceive in it distinct advantages over existing practices.

Table 5: Distribution of respondents according to their farm size

Farm size (ha)	Respondents	Percentage
1 – 3	86	44.8
3.1 – 6.0	56	29.2
6.1 – 9.0	24	12.5
9.1 – 12	16	8.3
>12	10	5.2
Total	192	100

Table 5 showed that most farmers (74%) in the study area cultivated between 1- 6ha of land while 20.8% have farm size between 6.1 and 12ha and only 5.2% have more than 12ha. This confirms the report of the Nation Newspaper that few of the problems associated with maize farmers in the study area and to a greater extent in Bauchi state are small farm size and low income earning (The Nation, 2009). This may be a result of problem of land tenure which ravaged the state in general.

Table 6: Effect of source of seed on performance of SG 2000

		Yield in bags			
Sources of seed	Respondents	1 – 10	11 – 50	51 – 100	>100
BSADP	70	10 (14.3)	22 (31.4)	26 (37.1)	12 (17.1)
BASAC	56	12 (21.4)	16 (28.6)	18	(32.1)
2(17.9)					
Market	40	12 (30)	20 (50)	6 (15)	2 (5)
Previous harvest	18	5 (55.6)	4 (52.9)	-	-
From friends	8	4 (50)	4 (50)	-	-
Total	192	48	70	50	24

*Data in parenthesis are percentages

The results showed that 54.2% of the farmers that got their seed from (Bauchi State Agricultural Development Programme (BSADP) harvested more than 50 bags even to the tune of 100 bags or more, and likewise Bauchi State Agricultural Supply Company (BASAC), 20% of the farmers that bought their seeds from market had 50 bags or more of maize while none from farmers that planted seed from previous harvest or those from friends could get more than 50 bags of maize. There is increase awareness among farmers in the study area on the need for them to get their

seed from good source if they actually want best output. Since most farmers in the study area got the innovation from extension agents (Table 6), this results imply that 35(3.5%) and 28(29.2%) of the respondents that obtained their seed from ADP and BASAC, respectively are as a result of extension agents.

Table 7: Average yield of maize before and after SG 2000 adoption in the study area

Farm size (ha)	Frequency before adopting SG 2000 Yield (bags)	Frequency afteradoptingSG 2000	Percentage increase
1 – 3	10	16	60
3.1 – 6.0	24	40	66.7
6.1 – 9.0	40	80	100
9.1 – 12	75	158	110.7
>12	120	276	130

Table 7 above showed high percentage increase in the yield obtained by the farmers in the study area after adopting SG 2000. Farmers with farm size of 1-3 ha had 60% increase, farmers with farm size of 3.1-6.0 ha had 66.7% increase while those with 6.1 - 9.0 recorded 100% increase. Much more increase of 110.7% and 130% were recorded by farmers that cultivated 9.1-12ha and greater than 12 hectares, respectively. This confirms the reports giving by Sasakawa Africa Association (2007), who reported increase in yield as a result of SG 2000 adoption across many states like Jigawa, Kano, Bauchi, Gombe, Kaduna and Katsina. Also, Jamilu *et al.*, (2014) had earlier opined in their report that size of farmland is expected to aid the adoption of new technologies by farmers because farmers that lack enough farmland cannot sacrifice their land for trials of a new technology.

Conclusion

This study has highlighted that young ones in their active ages predominate maize production in the study area; this is an indication that maize production has a promising future. Extension agents played a key role in taking the innovation of SG 2000 to the farmers in the study area and to link them up to source of good seed. Nevertheless, there are not many working class farmers among the respondent, though the result showed that the few ones had better output that the non-working class farmers. Overall result indicated a good percentage yield increase as a result of adoption of SG 2000 compared to the existing traditional method of maize production in the study area.

Recommendation

For SG 2000 technology to gain grounds in the study area such that the effect will be seen in the farmers' increased income and in the market, the following recommendations will be found useful:

(i) Most of the farmers in the study area were still in their active age, they should be encouraged to improve on their education, and this will be of great benefit in improving farming activities later in life.

(ii) Extension agents should not limit their efforts to non-working farmers but equally extend their work to the working class farmers. Sasakawa technology requires highly or even moderately educated people to go into people to go into production and apply the technology accurately.

(iii) Land acquisition should be made easy for people who want to engage in farming.

(iv) Farm inputs such as improved seed, fertilizers, chemicals, and farm implements should be provided at affordable prices for the farmers. Also markets where the produce would eventually be sold should be made available by the government at all levels.

(v) More training, workshop and meeting should be organized by relevant bodies like Agricultural Development Programme for the farmers in the study area and the state as a whole to enlighten farmers on the true application of the agronomic principles of Sasakawa technology such as early planting, incorporation of fertilizer into the soil, early weeding, disease/pest control, proper spacing and correct plant population.

Finally, for SG 2000 technology and other related technologies to survive in the study area and the state as a whole, it should be noted that technology development, advancement and diffusion requires investments in research and extension as well as the creation of an institutional environment favourable for sustaining the whole process of diffusion. All relevant bodies, organization and stakeholder in agriculture and government at all levels should be involved in diffusion of agricultural technology innovation.

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