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FACTORS CONSTRAINING FARMERS USE OF IMPROVED COWPEA TECHNOLOGIES IN BAUCHI AND GOMBE STATES OF NIGERIA

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ABSTRACT

This paper investigated major factors constraining the use of improved cowpea technologies among farmers in Bauchi and Gombe states of Nigeria. A structured interview schedule was used to collect data from a randomly selected sample of 130 farmers. Data were factor analyzed using the principal factor model with iteration and varimax rotation. The results show that land and labour problems, marketing problems, poor technical information, cultural incompatibility, high cost of farm inputs and unavailability of necessary inputs were the major factors constraining the use of improved cowpea technologies in the area. These findings suggest that there is an urgent need for researchers, policy makers and administrators of extension service to consider these factors seriously, if increased cowpea production is to be achieved by farmers in the area.

Keywords: *Cowpea, technologies, Bauchi, Gombe*

INTRODUCTION

Cowpea (*Vigna unguiculata* (L.) Walp) is an important source of cheap dietary protein and other nutrients in most developing countries of the world where animal protein are beyond the financial reach of a large segment of the population (Anazonwu-Bello, 1976).

As food, cowpea constitutes a regular part of the diet and provides a major part of the protein requirements of the rural people (Prince *et al*, 1986; Quin, 1997). In fresh form, the young leaves, immature pods and peas are used as vegetable, while several snacks and main dishes are prepared from the grain. In addition, because the grain is widely sold out of the major production areas, it provides cheap protein for relatively poor urban communities as well as income for the farmers.

However, despite the value of this legume, its maximum contribution to mankind has not been fully exploited by farmers due to low productivity problems. The low production estimates of farmers that range from <100 to 330kg ha^{-1} (Rachie, 1985; Mortimore *et al.*, 1997), are linked with unimproved varieties cultivated, heavy biotic pressures, sub-optimal planting dates, low plant population and low soils fertility status.

To overcome these problems, the International Institute of Tropical Agriculture (IITA) in collaboration with the Institute for Agricultural Research (IAR), Zaria developed the multiple disease and pest-resistant, high-yielding varieties and short duration strains together with more efficient production practices designed for a broad range of growing conditions (Singh and Ntare, 1985; IITA, 1993).

According to Fadiji *et al* (1996), the Agricultural Extension Services of the Institute for Agricultural Research and the States' Agricultural Development Programme have since 1988 been disseminating research results on these innovations to cowpea farmers. Unfortunately, available data show that the expected increase in productivity as a result of the advantages of-

fered by the use of these improved cowpea technologies have not been realised (FOS, 1995 and 1996). These suggest that farmers are not using these technologies.

The objective of this study was therefore to ascertain the major factors constraining the use of these improved cowpea technologies among farmers in Bauchi and Gombe States of Nigeria.

MATERIALS AND METHOD

The study was conducted in Bauchi and Gombe States of Nigeria. The two states have a combined population of 4.2 million (FOS, 1996), and a combined land area of 64,605 km^2. Average population density is 65 persons per km^2. The mean annual rainfall ranges between 1000mm and 1500mm (Shaib *et al.*, 1997). The two states have similar ecological features and fall within the sub-humid sub-zone of the North East Savanna Zone of Nigeria.

Seven Extension Blocks (EBs) were randomly selected out of the fifty-seven EBs in Bauchi State, while six EBs were randomly selected out of the fifty-two EBs in Gombe State. From each block 10 to 12 farmers were randomly selected for interview. In all 145 cowpea farmers were sampled. A structured interview schedule was used for data collection. Only 130 correctly filled interview schedules were used for analysis.

To determine the magnitude of the constraints as perceived by the farmers, a five point Likert-type scale was utilized. The response options ranged from "not at all" to "to a very great extent" scaled 1 to 5 respectively. The improved cowpea technologies included in the study, were the use of improved cowpea varieties, hiring/use of tractors for land preparation, use of correct spacing (inter-row 75cm, and within-row 20-30cm), application of fertilizer (single super phosphate) before planting, and use of herbicides for weed control (Harkness *et al.*, Fadiji *et al.*, 1996). Others include, spraying with fungicides five weeks after sowing to control diseases, application of single super phosphate fertilizer at 200kg/ha of cowpea farmland and spraying of insecticides during the post flowering period to control pests on cowpea farms (Harkness *et al.*, 1984; Fadiji *et al.*, 1996).

Factor analysis, using the principal factor model with iteration and varimax rotation was used to determine major variables constraining the use of improved cowpea technologies. The loadings under each factor (beta weights) represent a correlation of the identified constraint factor and has the same interpretation as any correlation coefficient. Kaiser's criterion using factor loadings above 0.30 was adopted in naming and interpreting the factors and constraint variables (Child, 1978; Madukwe, 1996; Agwu and Anyanwu, 1996).

RESULTS AND DISCUSSION

Factors constraining the use of Improved Cowpea Technologies

Environmental Factors

Data on Table 1 show the environmental factors constraining improved cowpea technologies based on the loading of issues, under the two extracted factors. Factor 1 was named "land and labour problems" while factor 2 was named "marketing problems"

Factor 1 "land and labour problems" was dominated by unavailability of labour required to carryout essential farming activities (0.68), low soil fertility (0.67), high cost of hired labour (0.60), scarcity of farm land (0.52) and drought problems (0.50). Pierce (1990) observed that the quantity and quality of resources (land, labour, and capital), and the availability of technology provide the impetus for growth when optimum or constrain when sub-optimum with the food system. However, the land and labour problems of the farming communities show the lack of optimum conditions necessary for increased production of the crop (cowpea).

The loadings under marketing problems include, lack of ready market for improved cowpea technology products (0.84), low consumer preferences associated with improved cowpea produce (0.71) and unavailability of good storage facilities (0.63). Unlike the local cowpea varieties, which are late-maturing and mostly harvested during the dry season, most improved cowpea varieties are short-duration types which

Table 1: Varimax Rotated Environmental Factors Constraining Farmers' Use of Improved Cowpea Technologies

Environmental-Related Variables	Factor 1 (Land and Labour Problems)	Factor 2 (Marketing Problems)
Scarcity of farm land.	0.52	0.24
Low soil fertility.	0.67	-0.01
Unavailability of labour required to carryout essential farming activities.	0.68	-0.18
High cost of hired labour in the area.	0.60	-0.55
Drought problems (lack of rains).	0.50	0.16
Lack of ready market for improved cowpea technology products.	0.20	0.84
Unavailability of good storage facilities.	0.10	0.63
Low consumers' preferences associated with improved cowpea products.	-0.10	0.71

Table 2: Varimax Rotated Cultural Factors Constraining Farmers' Use of Improved Cowpea Technologies

Socio-Cultural Related Variables	Factor 1 (Poor Technical Information)	Factor 2 (Cultural Incompatibility)
Difficulty in integrating technology into existing production systems.	0.18	0.72
Lack of adequate technical knowledge in the use of improved cowpea technologies.	0.87	0.10
Conflict between technology and the norms of the people.	0.19	0.47
Poor storage of seeds of improved cowpea varieties.	-0.05	0.61
High incidence of pests (insects) attacks on improved cowpea varieties.	-0.28	0.27
Lack of contact with important information sources on improved cowpea technologies.	0.70	0.07
Complexity of improved cowpea technologies.	0.60	0.10

mature at the peak of the rainy season. This necessitates immediate disposal of the produce. However, the high moisture content of cowpea seeds harvested at this time, makes its disposal in the market very difficult due to low consumer preferences associated with them. Again, seeds harvested during this period cannot be effectively stored with the available storage facilities due to their high moisture content. Agboola (1980) and Okuneye (1994) have pointed out the urgent need to match all efforts geared towards increased production with adequate and efficient storage facilities to save the crops that are produced from deterioration and waste.

Cultural Factors

Table 2 shows the loading of items under the two extracted factors. Based on the clustering of items, factor 1 was named "poor technical information" and factor 2 was named "cultural incompatibility". The two represent the major cultural-related factors constraining farmers use of cowpea technologies.

Specific issues with high loadings under poor technical information include lack of adequate technical knowledge in the use of improved cowpea technologies (0.87), lack of contact with important information sources on improved cowpea technologies (0.70) and complexity of improved cowpea technologies (0.60). Agricultural technology transfer is a process with multiple functions which include information, teaching, technology supply and technology service (Asiabaka, 1991). This implies that the recipients of the technology require technical knowledge that underlie the formulae and design technology (Okono, 1994). Hence, the poor technical know-how status of the farmers may contribute in making adoption of improved cowpea technologies difficult.

Issues that loaded high under cultural incompatibility include difficulty in integrating technology into existing production systems (0.72), poor storage of seeds of improved cowpea varieties (0.61) and conflict between technology and the norms of the people (0.47). In other words, improved cowpea technologies generated by research emphasized more of technological feasibility and economic viability through the use of high-yielding varieties with less emphasis on cultural compatibility with traditional norms and farming systems. While intercropping of cowpea with millet and/or sorghum or maize, with or without groundnut are the commonly practiced cropping systems of the farmers (Mortimore *et al*, 1997), initial cowpea improvements focused on the selection of genotypes that perform well in sole cropping. Again, the improved (early-maturing) varieties which mature at the peak of the rainy season make harvesting tideous and laborious for the farmers who are compelled at the expense of other activities, to visit the farms regularly to avoid heavy losses in the field due to high moisture content of the seeds. This does not suit the farmers' production systems. Agricultural technology worthy of transfer should be compatible with the cultural domain of the people and hence the production domain of the farmers should be examined before introducing an innovation.

Economic Factors

Data in Table 3 show the varimax rotated economic-related factors constraining farmers' use of improved cowpea technologies. On the basis of item loadings, factor 1 was named "high cost of inputs" and factor 2 was named "unavailability of necessary inputs"

Issues with high loading under high cost of inputs include, high cost of acquiring/hiring tractors for land preparation (0.82), high cost of available agro-chemicals (insecticides/fungicides/ herbicides) (0.69), high cost of improved cowpea seeds (0.64), high cost of inorganic fertilizers (0.58) and lack of finance to carryout farm operation associated with improved cowpea technologies (0.56). In many circumstances the development of sustainable production requires increased use of purchased inputs such as seeds, fertilizers, pesticides and equipment. However, this also demands the availability of fund; consequently the poor economic condition of the farmers constrains them in using improved cowpea technologies

Items which loaded high under unavailability of necessary inputs include difficulty in acquiring/hiring tractors for land preparation (0.64), unavailability of agrochemicals (insecticides/ fungicides/ herbicides) (0.55), difficulty in ac-

Table 3: Varimax Rotated Economic Factors Constraining Farmers' Use of Improved Cowpea Varieties

Economic-Related Variables	Factor 1 (High Cost of Inputs)	Factor 2 (Unavailability of Necessary Inputs)
Lack of finance to carryout farm operations associated with improved cowpea technologies.	0.56	0.17
Unavailability of improved cowpea seeds.	0.17	0.52
High cost of improved cowpea seeds.	0.64	-0.06
Difficulty in acquiring/hiring tractors for land preparation.	0.21	0.64
High cost of acquiring/hiring tractors for land preparation.	0.82	-0.02
Scarcity of inorganic fertilizers.	0.42	0.44
High cost of inorganic fertilizers.	0.58	-0.02
Unavailability of agro-chemicals (insecticides/fungicides/herbicides) needed for spraying.	-0.04	0.55
High costs of available agro-chemicals (insecticides/fungicides/herbicides) are costly.	0.69	-0.03

quiring improved cowpea seeds (0.52) and scarcity of inorganic fertilizers (0.44). The unavailability of these inputs may frustrate farmers' efforts in accepting improved cowpea technologies thereby constraining the overall effectiveness of technology transfer and adoption. In other words, the non-availability of these essential inputs can influence the farmer in many ways. For instance, while some farmers may not use the technologies at all; others may partially use the non-input components and reject the farm input aspects. Some other farmers may use the technologies and later reject or modify them in order to make allowance for the unavailable inputs. However, modification of recommended inputs may have negative or positive effects on the output of improved cowpea technologies.

CONCLUSION

The findings of this study show that factors constraining farmers' use of improved cowpea technologies include land and labour problems, marketing problems and poor technical information. Others include, cultural incompatibility, high cost of inputs and unavailability of necessary inputs.

Institutional cowpea improvements directed at increasing yield of the farmers appear to have failed to adequately meet the needs and requirements of their physical (climate, soil, abiotic/biotic stresses) and socio-economic (economic status, user concerns, consumer preferences, markets, etc.) environments. This suggests the need for researchers, policy makers and administrators of extension services to consider seriously these issues which constitute limiting

factors to increased cowpea production in the area.

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