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COWPEA VARIETAL NEEDS OF FARMERS IN BAUCHI AND GOMBE STATES OF NIGERIA

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ABSTRACT

This paper investigated cowpea varietal needs of farmers in Bauchi and Gombe states of Nigeria. A structured interview schedule was used to elicit information from a randomly selected sample of 130 farmers. A majority (53.8%) of the respondents grew a combination of local and improved cowpea varieties on their farms. The six most popular cowpea varieties grown by the respondents included ITA 60, TVx 3236 and Ife Brown, as well as, "Kanannado", "Yaro da kokari", and "Bogoro". Specifically, a majority (40.4 per cent, 59.4 per cent and 31.8 per cent) of the respondents grew Kanannado for its high yielding attribute, good seed qualities and pest/disease tolerance, respectively. Similarly, 28.9 per cent, 21.6 per cent and 34.6 per cent of the respondents grew ITA 60, Ife Brown and Yaro da kokari, for early maturity, good cooking qualities and drought tolerance of the varieties, respectively. It further revealed that although improved cowpea varieties recorded considerable high scores on cowpea farms, a local variety (Kanannado) was the dominant variety grown by farmers in the area. This implies that institutional cowpea breeding improvements directed at increasing yields of the farmers appear to have inadequately met the needs and requirements of their physical and socio-economic environments. This fact suggests the need for decentralised breeding approaches. The central issue here is how best to meet users' concerns. This calls for better information on user needs and demand-driven systems of breeding. Given the diversity and range of sophistication of farmers' knowledge and practices, these requirements can be met in full by involving farmers in the breeding process, especially in making a choice between a wide range of cultivars to be promoted and in dissemination of products from breeding programmes.

Keywords: Improved cowpea, *Vigna unguiculata*, Cowpea needs.

INTRODUCTION

In Nigeria today, cowpea *(Vigna unguiculata* (L.) Walp), is one of the dominant sources of cheap dietary protein and other nutrients in many rural and poor urban communities (Anazonwu-Bello, 1976; Quin, 1997). Although the crop is extensively grown in most areas north of the confluence of the River Niger and Benue, cultivation is concentrated in the drier regions of Northern Nigeria (Singh *et al.*, 1997)

In fresh form, the young leaves, immature pods and peas, are used as vegetables, while several snacks and main dishes are prepared from the grain (Rachie, 1985). The vegetative parts of cowpea, excepting pods, are harvested for fodder. In West and Central Africa, farmers who cut and store cowpea fodder for subsequent sale at the peak of dry season have been found to obtain as much as 25 per cent of their annual income by this means. Fodder yields of 0.5t ha^{-1} (air dry haulms) are commonly obtained in northern Nigeria (Quin, 1997).

Going beyond its importance as food, feed and source of income, cowpea can arguably be regarded as the fulcrum of sustainable subsistence agriculture in marginal lands and drier regions of the tropics, where rainfall is scanty and soils are sandy, with little organic matter (Singh *et al.*, 1997). This is especially so for Northern Nigeria. In these production systems, the spreading, indeterminate or semi-determinate bushy growth of cowpea provides ground cover, thus suppressing weeds and providing some protection against soil erosion (Lal, 1980; Gomez and Gomez, 1983). Another important feature of cowpea is that it fixes atmospheric nitrogen through symbiosis with nodule bacteria *(Bradyrhizobium Spp.)*. In so doing, the crop does not deplete the natural (and low) reserves of soil nitrogen, and many experimental findings illustrate that soil Nitrogen levels increase following cowpea (Singh and Rachie, 1985; Giller and Wilson, 1991; Mulongou *et al.*, 1992). A contribution of 40-80 kg N ha^{-1} is the commonly obtained range, while the total amount of nitrogen fixation through cowpea cultivation is 70-350 kg ha^{-1} (Mulongou *et al.*, 1992). Nitrogen obtained from biological nitrogen fixation such as that from cowpea cultivation is especially important for subsistence farmers, as fertilizer-nitrogen is scarce and costly.

However, the low cowpea production estimates

of farmers that range from below 100 to 330 kg ha^{-1} have limited the contributions of this all-important legume in the country (Singh *et al.,* 1997). These low production estimates are linked with the unimproved varieties cultivated, heavy biotic pressures, sub-optimal planting dates, low plant population and low soils fertility status (Rachie, 1985; Singh and Singh, 1990; Mortimore *et al.;* 1997).

The International Institute of Tropical Agriculture (IITA) in collaboration with the Institute for Agricultural Research (IAR) Zaria, Institute of Agricultural Research and Training (IAR&T) Ibadan and other scientists in the country using the concept of the Nationally Coordinated Research Project (NCRP) (IITA, 1993; Olufajo, 1997) have developed improved cowpea varieties designed for a broad range of growing conditions. According to Fadiji *et al* (1996), the agricultural extension services of the Institute for Agricultural Research and the different States' Agricultural Development Programme have since 1988 been disseminating research results on these innovations to farmers in Bauchi, Gombe, Kaduna, Kano, Katsina, Kebbi, Zamfara, Jigawa and Sokoto States of Nigeria. Incidentally, many of these improved cowpea varieties are yet to be effectively adopted by the cowpea farmers (Agwu, 2001) with the result that the local varieties still dominate in most areas.

According to Idachaba (1980) traditional farm technologies are incapable of increasing food production to meet rising demand for farm products. In other words the development and spread of new technology is essential for the continuing growth of agricultural production and incomes. In the past, some agricultural growth has been achieved by expanding the area of land under cultivation, which is by increasing the amounts of resource inputs used. Today most of the available "virgin" land has been brought into agricultural use. Hence it is now recognized that most of the desired output growth must come from increasing productivity of the land, labour and other resources. This requires the widespread and continuous adoption of new technology in the form of both new methods of production and new products (Upton, 1997).

Earlier research works carried out by Dorp and Utomo (1989) and Dorp and Rulkens (1993) in Indonesia, show that farmers decision to adopt or reject particular crop varieties was influenced by a number of reasons, some of which are market-driven or socio-culturally based. This study, therefore, sought to ascertain the cowpea varietal needs of farmers in Bauchi and Gombe States of Nigeria.

MATERIALS AND METHOD

The study was carried out in the Northeast Savanna Zone of Nigeria. Two states, namely, Bauchi and Gombe, which fall within the sub-humid sub-zone of the Northeast Savanna zone, were purposively selected for the study because cowpea cultivation features prominently in the two states and the two states have similar ecological features. The two states have a combined population of 4.2 million (FOS, 1996), and a combined land area of 64,605km^2. Bauchi state is divided into fifty-seven (57) extension blocks by the Bauchi State Agricultural Development Programme (BSADP), while Gombe state is divided into fifty-two (52) extension blocks by the Gombe State Agricultural Development Programme (GSADP). Using the delineation by the BSADP and GSADP, seven and six extension blocks were randomly selected from Bauchi and Gombe states, respectively. From each block, 10 to 12 farmers were selected using a simple random sampling technique. In all, 145 cowpea farmers were sampled using structured interview schedule. However, only 130 completed interview schedules were used for analysis.

To ascertain the major cowpea varieties grown in the area, each farmer was asked to give a maximum of five cowpea varieties grown, the first year each variety was grown and the major reasons for growing each of the varieties. A preliminary visit of the study area had earlier shown that Hausa is the common language. Hence, during the focus group discussions held with the farmers in the various communities efforts were made to identify each variety including the landraces with the commonest Hausa name using their morphological and agronomic characteristics. Percentages were used to analyse the data collected.

RESULTS AND DISCUSSION

Cowpea Varieties Grown

About two per cent of the respondents grew improved varieties alone. About 44 per cent of the respondents grew only local cowpea varieties, while a majority (53.8 per cent) grew local and improved cowpea varieties either in mixtures or solely in their farms

Major Cowpea Varieties Grown in the Area

A large number of cowpea varieties were grown by farmers, ranging from eighteen in Gombe State to twenty-three in Bauchi State. However, most respondents grew about three to five varieties in the two states. "Kanannado", "Yaro da kokari" "Bogoro", as well as, ITA 60, TVx 3236 and Ife Brown were the most popular

Table 1: Percentage distribution of respondents by cowpea varieties grown

Cowpea variety	Percentage
Improved cowpea varieties	2.3
Local Cowpea Varieties	43.9
Improved/Local Cowpea Varieties	53.8

Source: Field Data 2000

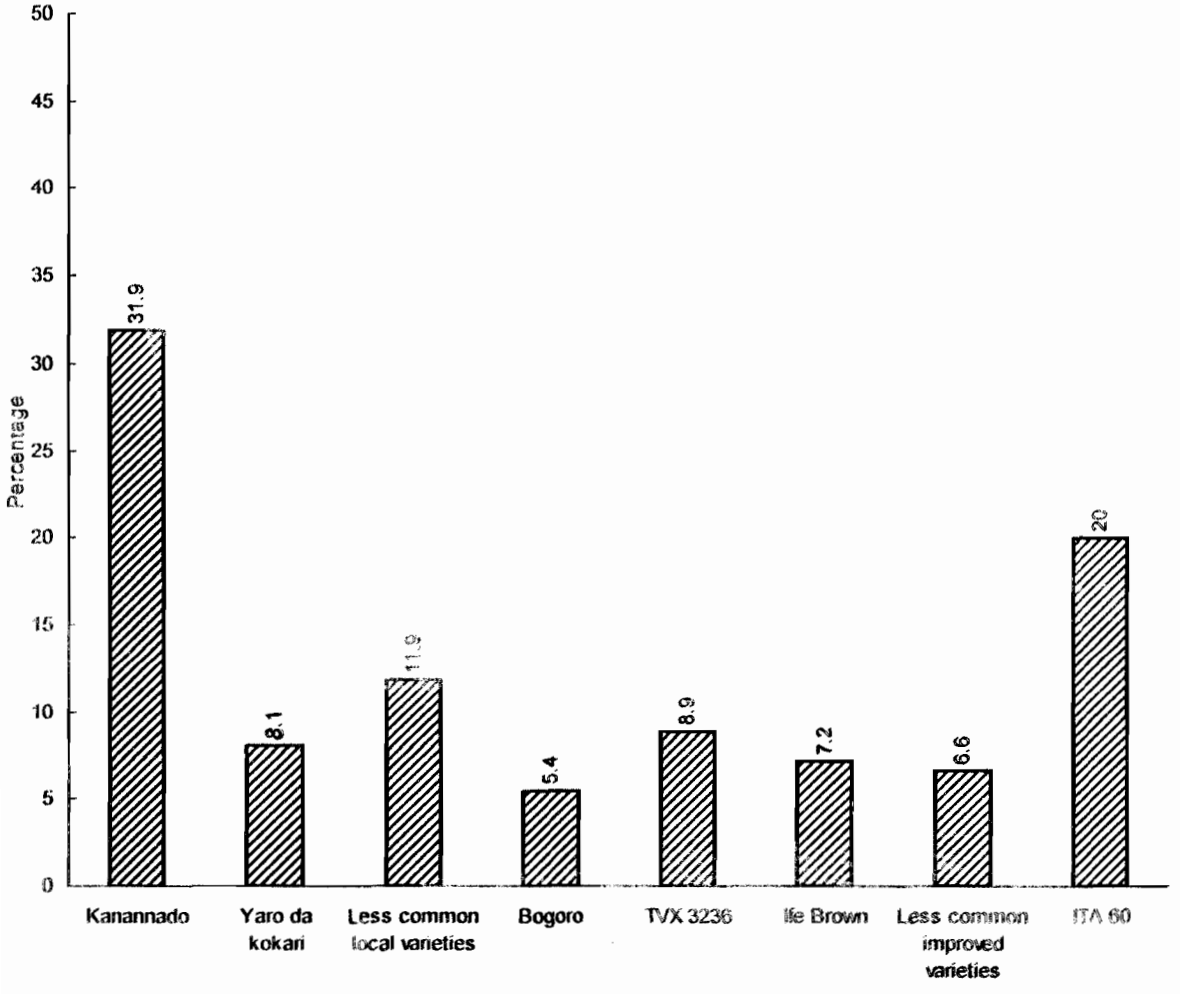

Fig. 1: Major cowpea varieties grown by the farmers

cowpea varieties, grown by 20 per cent or more of the respondents. Farmers in the area of study grew a large number of less common varieties, but about half of the varieties in each area were grown by only a small proportion of farmers (often less than 10 per cent of farmers).

Of all the varieties observed in the fields, the local variety, "Kanannado" (31.9 per cent) was the most widely grown. This was followed by two improved varieties, namely, ITA 60 (20 per cent) and TVx 3236 (8.9 per cent). Other popular cowpea varieties grown in the area were "Yaro da Kokari" (8.1 per cent), Ife brown (7.2 per cent), and "Bogoro" (5.4 per cent) (Fig. 1). Other less common local varieties included "Dogo" "Farin Wake" "Jan Baki" "Yar Duga" "Achi Shiru" "Dan Gozo" "Nazari" and "Goshin Biri". The less common improved cowpea varieties grown in the area were IAR 1696, Ex Gaidam, TVx 1234, Dan Arbain and Rienna Cowpea. The former accounted for 11.9 per cent and the latter 6.6 per cent of the total cowpea varieties grown.

Even though improved cowpea varieties recorded considerable high scores on cowpea farms, a local variety (Kanannado) is the dominant variety grown by farmers. This could be as a result of lack of and/or difficulty in acquiring improved cowpea seeds during the cropping season, or the variety's possession of attributes desired by majority of the farmers.

Major Cowpea Attributes Responsible for Choice of Varieties

The six major reasons for cultivating the cowpea varieties commonly found in the area are discussed in connection with the attributes relating to the reasons as follows: early maturity, high yield, good seed qualities, good cooking qualities, pest/disease tolerance and drought tolerance.

The total number of responses recorded for each desired cowpea attribute is presented in Table 2. Also, Figure 2 shows the percentage distribution of cowpea varieties cultivated on the basis of these six major desired attributes.

High Yield

High yield is the most frequently cited reason for cultivation of cowpea varieties found in the area. Figure 2 shows the percentage distribution of farmers based on their perception of this attribute as a major reason for cultivation the different cowpea varieties grown in the area. Kanannado had the highest percentage (40.4 per cent) of farmers cultivating it because of its high yielding attribute. TVx 3236 and ITA 60 followed with 16.4 per cent and 12.3 per cent of farmers cultivating them for the same attribute. Other major varieties grown in the area based on this attribute include Ife Brown (4.1per cent), "Bogoro" (4.1per cent) and Yaro da Kokari (3.6 per cent). Also, other less common local and improved varieties grown for their high yielding characteristics constituted 13.2 per cent and 5.9 per cent respectively. This finding shows that high yield constituted a major objective of the farmers and could have been responsible for the observed dominance of the Kanannado variety in the study area. Kornegay *et al.*, (1996) in their study also found that yield (pod number) of beans was an attribute for which farmers in Colombia commonly selected genotypes.

Early Maturity

Variation in maturity period played an important role in the farming system of cowpea farmers and hence constituted a major reason for which cowpea varieties were commonly cultivated in the area. In some cases, early-maturing varieties were tolerated despite their perceived poor taste, poor storage qualities and higher labour demand, the major reason being to bridge the pre –harvest or hungry gap in food availability.

About 30 per cent of the farmers indicated early maturity as a major reason for cultivating ITA 60 variety, while 20.5 per cent and 12.1per cent of the respondents indicated that they cultivated TVx 3236 and Ife Brown respectively, for the same reason. Also, 26.5 per cent of the respondents indicated that they cultivated other less popular improved varieties based on their early maturing attributes. However, 7.2 per cent, 3.6 per cent and 1.2 per cent of the respondents indicated that they cultivated "Bogoro", 'Yaro da Kokari' and "Kanannado" varieties respectively for the same reason (Fig. 2).

It could be deduced that the acceptability of ITA60 and TVx 3236 were mainly derived from this attribute, among others. However, the findings also suggest that farmers were aware of the fact that most local cowpea varieties are late maturing. Hence the dominance of a late-maturing local (Kanannado) variety in the area could mean that some desired attributes, for instance high yield and/ or good cooking qualities is more important than early maturity during farmers varietal selection.

Good Seed Qualities

Issues relating to the physical nature of seeds were the third most frequently cited reason for cultivating cowpea varieties found in the area. Good seed qualities refer to the colour and size of the seed. Generally, farmers' preference favoured large, white, rough-coated seeds. Majority (59.4 per cent) of the respondents indicated that they cultivated "Kanannado" variety because of these qualities (Fig. 2). Also, varieties like "Bogoro", ITA60 and Ife Brown were cultivated by 7.8 per cent, 6.2 per cent and 6.2 per cent respectively, for the same reasons. While, other less common local and improved cowpea varieties were cultivated for the same reasons by 14.2 per cent and 6.2 per cent of the respondents respec-

Table 2: Number of responses recorded for each desired cowpea attribute

Desired Attributes	Number of Responses								
	Kanannado	ITA 60	TVx 3236	Ife Brown	Bogoro	Yaro da kokari	Less common improved varieties	Less common local varieties	Total number of responses
High Yield	89	27	36	9	9	8	13	29	220
Early Maturity	1	24	17	10	6	3	22	0	83
Good Seed Qualities	38	4	0	4	5	0	4	9	64
Good Cooking Qualities	6	4	3	11	2	6	9	10	51
Pests/Disease Tolerance	14	8	3	3	2	7	1	6	44
Drought Tolerance	7	3	0	0	1	9	0	6	26

Source: Field data, 2000.

tively.

On the other hand, two major varieties "Yaro da Kokari"(a small white seeded local variety) and TVx3236 (a small seeded improved variety with beige eye patches) did not meet farmers' desires in this respect. The implication of this finding is that research efforts geared towards breeding of improved cowpea varieties for future adoption, should incorporate among other things, these desired seed qualities in their breeding programmes.

Good Cooking Qualities

Good cooking qualities were the fourth most frequently cited reasons for cultivating the major cowpea varieties found in the area. Good cooking qualities refer to such varietal attributes as short cooking time, acceptable taste and good grain expansion ability when cooked. Ife brown with 21.6 per cent scored highest on this desired attribute (Fig. 2). The farmers also indicated that this variety attracted high market value basically because of its sweet taste. Other major varieties cultivated for their perceived good cooking qualities include "Kanannado"(11.8 per cent), "Yaro da Kokari" (11.8 per cent), ITA60 (7.8 per cent), TVx 3236 (5.9 per cent) and "Bogoro" (3.9per cent). Also, 19.6 per cent and 17.4 per cent of the less common local and improved cowpea varieties respectively, were cultivated for the same reasons. It could, therefore, be deduced from this finding that the acceptability of Ife Brown variety in the area was mainly derived from this attribute, among others.

Pest/Disease Tolerance

The varieties were perceived by the farmers to differ in their resistance/ tolerance to pests/diseases attack. The local Kanannado variety (31.8 %) was the most favoured variety when issues relating to pest/ disease tolerance were considered by farmers as the basis for cultivation. This was followed by ITA 60(18.2 per cent), "Yaro da kokari"(15.9 per cent), TVx 3236 (6.8 per cent), Ife Brown (6.8 per cent) and "Bogoro" (4.6 per cent). Also, 13.6 per cent and 2.3 per cent of the less common local and improved cowpea varieties respectively were cultivated based on their pests/disease tolerance.

The low susceptibility of the local "Kanannado" variety to pests/disease attack was found to be closely linked to its late maturity attribute. Farmers indicated that this variety, which matures at the onset of the dry season (early November-December), requires little or no chemical spray for appreciable yields to be realised. This differs from the case of improved varieties which are mostly short- duration varieties that mature at the peak of the rainy season (August-September) when there is high incidence of diseases and pests attack and has generally failed to yield a bean crop at high density in sole crop without spraying (Harkness *et al.*, 1984).

The implication of this finding is that research efforts should recognise farmers' major priorities in their breeding programme. For instance, considering the resource poor nature of most cowpea farmers, it may be more appropriate if research efforts are shifted from the current emphasis of breeding improved early-maturing and high yielding cowpea varieties to breeding of improved late-maturing, high-yielding and pests/diseases tolerant cowpea varieties. This would enable the farmer not to

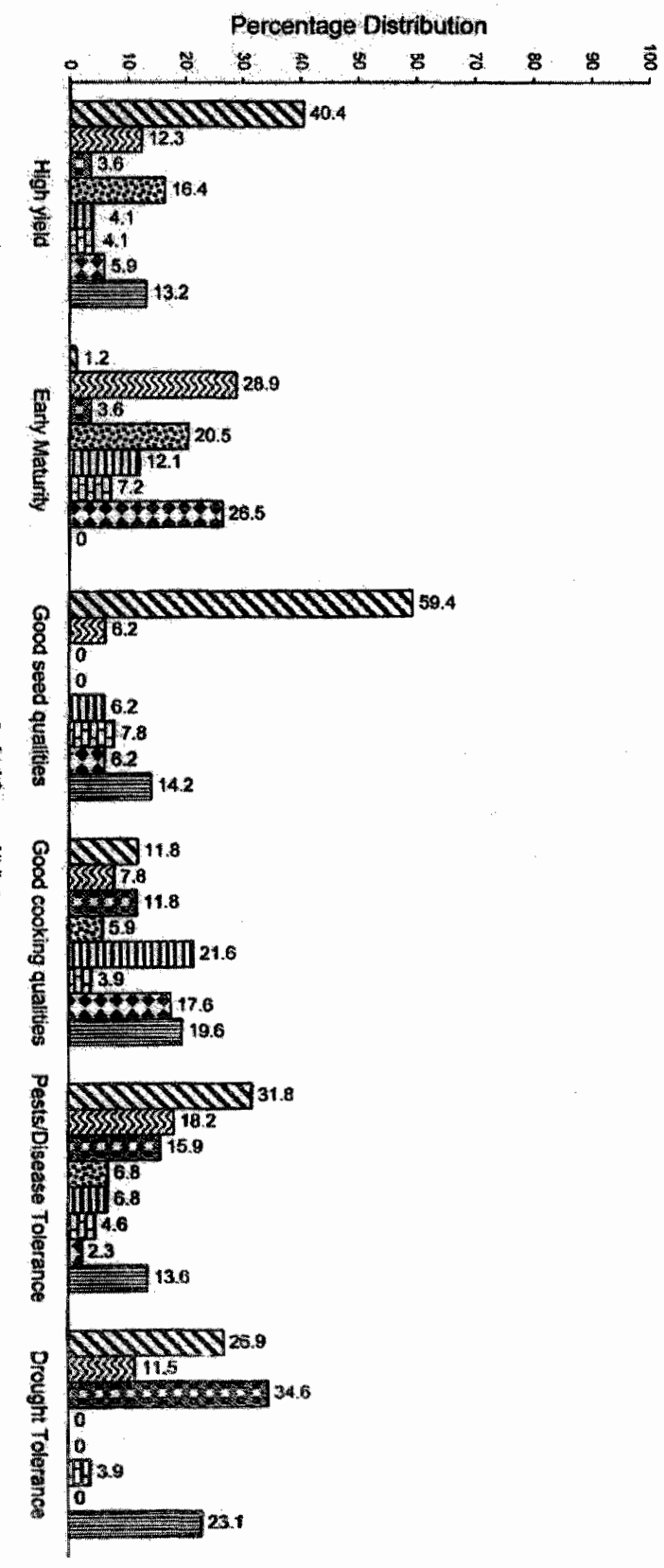

Fig. 2: Percentage distribution of cowpea varieties cultivated on the basis of six major desired attributes

depend on expensive chemicals for higher yields, which may not be economically feasible in the traditional mixed cropping systems of the farmers.

Drought Tolerance

Drought tolerance had a low relative frequency when compared with other major desired attributes, as a basis for cultivating the various cowpea varieties found in the study area. This could be derived from the fact that cowpea is a drought tolerant crop which grows better in warm climates (Singh *et al*, 1997). About 35.0 % of the farmers indicated drought tolerance as the major reason for cultivating "Yaro da Kokari" variety. This was followed by Kanannado (26.9 per cent), other less common local varieties (23.1 per cent) and "Bogoro"(3.9 per cent). However, of all the improved cowpea varieties grown in the area, only ITA 60 (11.5 per cent) was perceived as possessing this attribute. It could be deduced from this finding that the popularity of the "Yaro da Kokari" variety among farmers in the area, is mainly derived from this attribute among others.

Other Attributes

The other reasons less frequently cited for cultivating the cowpea varieties found in the area were plant growth habit, high fodder production, good storage qualities, striga tolerance, late maturity and ease of harvest. However, that these were not frequently cited reasons for cultivating the cowpea varieties found in the area does not necessarily mean that they were not important attributes.

CONCLUSION

Information on major cowpea varieties grown in the area showed that a majority of the respondents grew a combination of local and improved cowpea varieties on their farms. It was also discovered that the six most popular cowpea varieties grown by the respondents include ITA 60, TVx 3236, and Ife Brown, as well as, "Kanannado", "Yaro da kokari", and "Bogoro". The major reasons for cultivating these cowpea varieties include high yield, early maturity, good seed qualities, good cooking qualities, pest/disease tolerance, and drought tolerance. Specifically, the findings showed that a majority (40.4 per cent, 59.4 per cent and 31.8 per cent) of the respondents grew Kanannado for its high yielding attribute, good seed qualities and pest/disease tolerance. Similarly, 28.9 per cent, 21.6 per cent and 34.6 per cent of the respondents grew ITA 60, Ife Brown and Yaro da kokari, specifically for early maturity, good cooking qualities and drought tolerance of the varieties, respectively.

The study concluded that although improved cowpea varieties recorded considerable high scores on cowpea farms, a local variety (Kanannado) was the dominant variety grown by farmers in the area. This implies that institutional cowpea breeding improvements directed at increasing yields of the farmers appear to have inadequately met the needs and requirements of their physical (climate, soil, a biotic/biotic stresses) and socio-economic (economic status, user concerns, consumer preferences, markets, etc.) environments. Hence, although most of the improved cowpea varieties addressed important issues such as short cropping season, good cooking qualities, disease resistance, etc., their development was principally institutional and government-driven. In other words, while the innovations were technically feasible and indeed economically viable, most were not environmentally and culturally sustainable for most of the target farmers in the area studied.

The fact that institutional cowpea breeding programmes have not adequately met the needs and requirements of farmers physical and socio-economic environments suggests the need for decentralised breeding approaches. The central issue here is how best to meet users concerns. This calls for better information on user needs and demand-driven systems of breeding. In other words, determining farmers criteria for selection and using such as a basis for developing new cowpea varieties will save scarce resources that would otherwise be wasted. Given the diversity and range of sophistication of farmers knowledge and practices, these requirements can be met in full by involving farmers in the breeding process (participatory breeding approach), especially in making a choice between a wide range of cultivars to be promoted and in dissemination of products from breeding programmes.

In the same vein, the diversity of farming systems, their temporal variability and exposure to pest hazards, pose a major challenge to breeding. Rather than breeding a few high-yielding varieties whose adaptability is unknown to users, site-specific breeding of diverse cultivars may be more useful. According to Alghali (1991), insects are the biggest cause of yield losses in cowpea. Hence, breeding of cowpea with improved pest resistance is more likely to benefit farming households than marginal yield increases and should be promoted in order to properly stimulate the adoption of recommended cowpea technologies.

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