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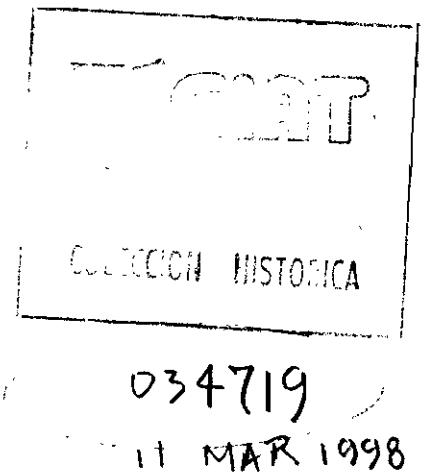

SOCIO-ECONOMIC SURVEY OF THREE BEAN GROWING AREAS OF MALAWI

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PREFACE

Beans are a near perfect food because of their nutritional characteristics. In Malawi beans are important both as food (a major source of protein) and as cash income to rural households. The crop is grown mostly by subsistence farmers; yields are very low—under 500 kg/ha—and Malawi is unable to produce adequate beans to feed its population.

Realizing the need for intervention, the Malawi Government initiated a national Bean Improvement Programme (BIP), with financial support from the Overseas Development Administration (now the Department for International Development) of the United Kingdom. The Programme is executed by the Centro Internacional de Agricultura Tropical (CIAT). It aims to encourage smallholder farmers to produce more beans by using acceptable high-yielding varieties and other technologies that address their needs and constraints. The Programme is expected to increase bean production, reduce market prices, encourage more consumption, and thus lead to less protein deficiency and malnutrition in Malawi.

This publication documents basic information collected through a survey conducted by the Programme on farmers' varietal preferences and other social characteristics related to bean production and consumption in selected impact areas. The survey was designed to complement information collected earlier by the Bunda College of Agriculture. Results are being used to refine research priorities and selection criteria, and will be particularly useful for assessing the impact of the Programme.

We hope that this initiative will contribute to the work of scientists in Africa and elsewhere who explore similar avenues in their endeavour to assist smallholder farming communities to raise their agricultural productivity.

This survey would not have been possible without the help of seven students from the Bunda College of Agriculture who were the enumerators. Their education in agriculture and their knowledge of the three areas where the survey was undertaken was invaluable. Dr. David Barton from the Natural Resources Institute also assisted greatly by checking the data, providing a further analysis and, thus, contributing to the draft document. The staff at the BIP provided essential logistic support. We thank Drs. Roger Kirkby and Soniia David for their comments on the draft document.

We gratefully acknowledge the encouragement and finanacial support of the Department for International Development, UK, that enabled our Programme to conduct and publish the survey reported here.

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ACRONYMS

ADMARC	Agricultural Development and Marketing Corporation
ADD	Agricultural Development Division
AE	Adult equivalent
BIP	Bean Improvement Programme
CAN	Calcium ammonium nitrate
CIAT	International Center for Tropical Agriculture
CRSP	Collaborative Research Support Programme
DAP	Di-ammonium phosphate
DfID	Department of International Development
EPA	Extension planning area
GNP	Gross national product
ITCZ	Intertropical convergence zone (meteorology)
masl	Metres above sea level
MK	Malawi Kwacha (MK 18.00 = US$1.00, December 1997)
MoAI	Ministry of Agriculture and Irrigation
RDP	Rural Development Project
RESAPAC	Reseau pour l'amelioration du haricot (*Phaseolus*) dans la région de l'Afrique Centrale
SA	Sulphate of ammonia
SHCA	Smallholder Coffee Authority

SUMMARY

The objective of this baseline survey was to provide some descriptive information about the bean production systems in the three targeted areas where the Bean Improvement Programme (BIP) focuses its off-station research activities. The survey was also to identify those bean varieties that farmers were using in these areas, as well as the characteristics, or criteria, by which smallholder farmers evaluated the potential of different varieties of beans.

The results of the survey confirmed the importance of beans in smallholder production systems, both as a major source of vegetable protein in the diets of most households and as a source of cash. The production and productivity levels are, however, limited by a fundamental lack of seed, and a lack of markets, or systems that would provide the opportunity to obtain seed of new bean varieties. These structural constraints are compounded by the farmers' poverty. As a result, most bean growers do not buy seed. Their main sources of seed are from their own previous harvests, or through exchange or purchase within their immediate communities. The survey suggested that the impact of input supply institutions, be it ADMARC, the private sector or NGOs, was little.

Relying on their own seed is risky for poor smallholder farmers. Adverse climatic conditions resulting in perpetually poor harvests, coupled with poor income-earning opportunities, and the need to feed their families mean that most households are often short of seed stocks for future planting because immediate needs supersede the long-term goal of saving seed for planting.

The varieties of beans grown in the three areas were different, so much so that only one variety, Nanyati (cranberry or sugar bean), was popular among all three areas. South Viphya had a notably different list of the most popular varieties to those of Bembeke and Kalira. The survey highlighted the problem of establishing varieties, that is, making them known, throughout an area. Nasaka (tan coloured seeds), now commonly favoured in Bembeke and Kalira, had been released in 1979 by the Bunda College of Agriculture, yet it had not been reported in earlier surveys (Ferguson et al. 1992) as a commonly grown variety. This suggests that, although farmers are keen to adopt new varieties, it takes time for a variety to be established (i.e., known) among farming communities.

The major criteria that farmers reported as important in new bean varieties are, in order of importance, higher yields, earlier maturity, better flavour and better cooking qualities. These are therefore key attributes that a research programme needs to address. Although established methodologies for agronomic selection exist, further attention needs to focus on the non-agronomic characteristics that smallholders express as preferred attributes.

INTRODUCTION

Malawi is a small country, encompassing 11.8 million hectares, and located in the southern Africa. The southern part of the country is surrounded by Mozambique, while it shares borders with Zambia to the north-west and Tanzania to the north-east. About 50% of the total land area is cultivated, 80% of which is available to smallholder farmers as customary land. The climate is subhumid, with unimodal rainfall, averaging 1200 mm annually and falling between November and April. Fluctuations between years are generally small, but evidence suggests a long-term decline both in total rainfall and in the length of the wet season. Soils are predominantly friable, permeable Latosols, with moderate natural fertility, although continuous cultivation and leaching has accelerated degradation in many areas. Topography varies from the Lower Shire Valley at 50 m above sea level (masl), through the central plains (1200 m), to mountains 3000 m high in the Southern Highlands (Cromwell and Zambezi 1993).

The country has a population of 11 million people, of which 47% are under 15 years old. Population growth is 3.3% per annum, a rate that imposes extreme pressure on the land and other resources, particularly in the south of the country where 51% of households live. Ranked on the basis of per capita GNP, Malawi is one of the 10 poorest countries in the world. The World Bank reported (1995) that 80% of smallholders earn incomes of less than MK 500 (US$100) per adult equivalent per year at the July 1993 exchange rates.

Smallholder Agriculture

More than 40% of smallholder households have holdings of less than 0.5 hectares; in this class, the average area of land cultivated is 0.28 hectares, carrying an average of 4 adult equivalents (World Bank 1995). The small sizes of farms dictate the farmers' production strategies. Most of the farmland is allocated to producing staple foods: 70% to maize, 27% to other food crops, and only 3% to non-food crops. Maize is less widely grown on the shores of Lake Malawi ('lakeshore'), where cassava and rice are more important. Beans are important across the country; grown in most mid- to high altitude areas during the rainy season. In low-lying areas, along the lakeshore, the crop is grown during the dry season. Beans are estimated to account for 10% of the cropped area. Millet and sorghum are locally important, especially in the Shire Valley, where they occupy about 10% of the area.

Cash Crops

The main non-food crop, or cash crop, grown by smallholder is burley tobacco. Historically, this crop was limited to commercial estates but, since the early 1990s, after the 'liberalization' of burley cultivation and marketing, smallholders also grow it. Production

is, however, more common among the 'not-so-poor' smallholders and richer smallholders with larger holdings (World Bank 1995). Other locally important cash crops are coffee in the north (Shire Highlands), and tea and sugar for a limited number of smallholders (Dwangwa).

Cropping Patterns

Cropping patterns correlate with the cultivated area of smallholder farmers (World Bank 1995). Larger smallholders put more land to hybrid varieties of maize, and poorer smallholders devote larger proportions of their land to local maize. However, the maize cropping system is not purely monocropping, and about 30% of the area allocated to maize is intercropped with a variety of pulses; with groundnuts and beans featuring highly in the mixtures.

Agricultural Development Strategies

Malawi, with the following constraints in mind—growing population pressure, limited land resources, small average land holdings, a rural population that lacks capital, poor education and with few alternatives for off-farm employment—the Malawi Ministry of Agriculture and Irrigation (MoAI) developed a strategy and action plan in 1995. This highlighted the extent of the need for Malawi's agriculture to increase food production and diversify the food and cash crops. Increasing the output of grain legumes, and of beans in particular, is an important part of this strategy. Beans form the primary source of vegetable protein and are consumed along with the staple, maize. Intercropping in particular is emphasized as a strategy for improving food security among smallholders—it reduces the risk of crop failure through reliance on a single crop. The strategy involves a commitment to expand bean production, and large-scale and smallholder farmers are encouraged to produce certified bean seeds (Ministry of Agriculture and Livestock Development 1995).

Bean Cultivation

Beans are commonly intercropped with maize, particularly in the rainy season (October to March), and most often in association with local maize. Beans are not so commonly intercropped with hybrid maize (Ferguson et al. 1992). Pumpkins and other minor vegetable crops are also common in maize-bean fields. Farmers plant both bush and climbing beans. Differences in planting dates associated with the movement of the intertropical convergence zone result in similar differences in harvesting dates for the main season bean crop. Harvesting takes place between February and April. As beans are commonly intercropped during this season, yield estimates and plant populations are often difficult to determine. Variations in planting density and varieties grown result in large

differences in yield per unit area from one farmer to another. A second, relay, crop of beans is planted towards the end of the rainy season, usually in the extreme northern and southern highlands of Malawi where prolonged rains allow a second crop of beans. Another bean crop is also grown in the dry season in low-lying areas (*dambos*), where advantage can be taken of residual moisture. This crop is commonly known as the '*dimba* crop' and is sometimes irrigated. Most *dimba* crops are grown in pure stand, although mixtures are also common.

THE BEAN IMPROVEMENT PROGRAMME

The project is funded by the Department for International Development (DfID) of the British Government in collaboration with the Government of Malawi, and receives technical support from the International Center for Tropical Agriculture (CIAT). The project is designed to support the National Bean Programme in its efforts to develop a range of appropriate bean production and utilization technologies to suit the needs of farmers and consumers in Malawi. The project will help improve the nutritional well-being of Malawians by making more vegetable protein available to consumers, and will help reduce poverty by increasing cash incomes for bean producers through improved bean production.

The BIP's main objectives are to:

1. Develop and multiply varieties of beans that are acceptable to small farmers (including women) and which address the principal biotic and abiotic constraints associated with bean production;

2. Accelerate the transfer of bean technology to small farmers (including women) through their participation in research design, management and evaluation, and in the identification of appropriate seed distribution systems; and

3. Strengthen the national research capacity to improve bean productivity.

The project aims to rapidly develop high-yielding bush and climbing bean varieties, and multiply their seeds to make several new bean varieties available to the farmers, while maintaining the genetic diversity of the crop on smallholder farms. To give it direction from the outset, the BIP required an analysis of the role of bean production on the farm and in the household economy. A baseline socio-economic survey was therefore undertaken in 1995. Three areas were targeted by the BIP—Bembeke, Kalira and South Viphya—according to the classification, developed by Ferguson et al. (1992), of the important bean-growing areas in Malawi.

THE BIP BASELINE SURVEY

Objectives

The survey's major objective was to provide a set of descriptive data on the cultivation and post-harvest uses of beans in the BIP's three targeted areas. In particular, the exercise was designed to provide future direction for the BIP with respect to the breeding varieties that would suit the needs of smallholder farmers. A comprehensive baseline survey of bean production practices and uses had already been carried out in 1990/91 by the "Bean/Cowpea Collaborative Research Support Program" (CRSP) of the Bunda College and the Michigan State University. The resulting document described bean production and uses in three regions of Malawi and provided a good foundation for a more site-specific investigation for the BIP's off-station research areas.

The BIP survey was therefore designed to complement the data provided by the CRSP survey and focused mainly on the BIP's own three targeted areas. The first expected output is a database of the bean varieties grown in the three areas and farmers' preference criteria . This output would help the BIP's breeding programme to focus its activities on farmers' needs in developing improved varieties and subsequently help minimize the adoption lag associated with new technologies that do not conform to smallholder preferences. A second output is information on farming systems and descriptive data on socio-economic factors that could be used to measure the impact of the project, mainly through documenting existing varieties, and the importance of the crop in terms of providing food and/or cash. A post-project evaluation could therefore document the adoption of bean varieties released from the BIP and ascertain if adoption was common and if the main uses of the crop had varied as a result of project activities.

Survey Methodology

Sample selection. A total of 450 households—150 in each targeted extension planning area (EPA) of Bembeke, Kalira and South Viphya—were selected at random for interviews. However, only 338 households were interviewed in August 1995: 123 in Bembeke, 110 in Kalira and 105 in South Viphya. An open-ended questionnaire was used to cover bean production systems, marketing and storage, bean consumption patterns and varietal preferences. Although the enumerators were instructed to try to ensure that the interviews were done with the main person responsible for growing beans in the household, most respondents were males.

Agro-ecology of the sample sites. The Bembeke EPA is situated about 115 km south-east of Lilongwe at 1660 masl in the Dedza Hills Rural Development Programme (RDP). The mean annual rainfall is 1067 mm, unimodal, and usually falling between

November and April, with most arriving during January (Appendix 1). The mean temperature from June to September is 19°C and between December and April 21°C.

The Kalira EPA is about 102 km north-east of Lilongwe, at 1560 masl, and falls within the Ntchisi RDP. It has an annual mean rainfall of 954 mm, unimodal, and peaking in January (Appendix 1). The mean temperature between June and September is 19°C and between December and April 21°C.

The South Viphya EPA is located about 500 km north of Lilongwe, at 1530 masl, in the Rumphi RDP. The mean annual precipitation is 848 mm, unimodal, and falling between November and April and peaking in February to March (Appendix 1). The mean temperature between June and September is 20°C and between December and April 21°C.

SURVEY RESULTS

Characteristics of the Extension Planning Areas

Bembeke. The Bembeke Extension Planning Area (EPA) stretches from the main Lilongwe—Blantyre road to the rift valley escarpment. The Bembeke trading centre is the site of a secondary school, a model primary school, and some shops. An agricultural research station, a depot of the Agricultural Development and Marketing Corporation (ADMARC), and the EPA offices are also situated in the area.

Respondents were grouped equally between male and female (Table 1). About 21% of households were headed by females, and the mean household size was six people. Of the female respondents (n = 62), 50% were married with a husband on the farm, 38% were single but had been married before, 9% were married but the husbands worked away, and 3% were single and unmarried (Appendix 2).

Table 1. Socio-economic characteristics (%) of three extension planning areas (EPA), Malawi, 1995.

Characteristic	Bembeke EPA (n = 123)	Kalira EPA (n = 110)	South Viphya EPA (n = 105)
Male respondents	50	65	63
Female respondents	50	35	37
Female-headed households	25	18	16
Received food aid, 1994/95	75	64	4
Worked as *ganyu*[a] labour, 1994/95	45	35	22
Able to hire labour, 1994/95	15	17	20

a. Casual labour.

Kalira. The main Ntchisi—Dowa road cuts through the Kalira EPA. The area has one small trading centre, located about 5 km from the EPA offices, and has an ADMARC depot, a maize mill, and some shops. About 10 km away are a small health centre and another trading centre where a school was under construction.

Of the sample, 65% of respondents were male and 35% female. About 18% of households had female heads, and the mean household size was six people (Appendix 2). Of the female respondents, 33% were married with a husband on the farm, 63% were single but had been married before, and 3% were married but the husbands worked and lived elsewhere.

Our findings showing a high proportion of women who had been married but were now single contrasts markedly with the CRSP survey results. They reported that female-headed households were rare. The difference may have been partly a result of sampling, but it may also reflect some of the dynamic changes affecting rural communities in Malawi, such as the transition from a traditional matrilineal inheritance system to a less well defined system and the increasing rate of divorce within the rural population. For the male respondents, 93% of the sample were married with a wife on the farm, 4% unmarried, and 4% single, but who had been married before.

South Viphya. The South Viphya EPA is located on the eastern escarpment, dropping down to the main Mzuzu—Karonga road as it passes through the Henga Valley. Rumphi is the closest urban centre, located about 35 km west of the EPA. The EPA administrative centre is at the Mphompa Trading Centre, where the Small-Holder Coffee Authority (SHCA) has its extension offices, training centre, and guest house. Mphompa is 20 km from the main paved road between Mzuzu and Karonga, and access is seasonal, with the road becoming impassable for long periods during the rainy season.

Of the 105 respondents, 63% were male and 37% female. Of the females, only 16% were household heads. The mean household size in South Viphya was seven people (Appendix 2).

Employment and Remittances

Bembeke. Few off-farm employment opportunities are available. Only 17% of the households were engaged in any off-farm employment. Of these, six were teachers, reflecting the employment opportunities offered by the two schools in the EPA. Other activities included building, carpentry, and several junior civil servants (e.g., messenger). Another indicator of the level of resources to which the community has access is the number of households who received some form of external assistance: 9% received cash, 2% received seed, 2% were given fertilizer, and 2% were given funds for school fees. All remittances were from relatives, except for seed, which was given by a church organization.

Kalira. This EPA had the lowest level of off-farm employment. Only six households had any off-farm employment. This reflected the area's isolation and the lack of employment opportunities. Respondents did not report external assistance from relatives, but 25% received free seed from the government. The lack of assistance from relatives suggested that little additional income entered the area from outside the community.

South Viphya. About 26% of the sampled population had some form of off-farm employment, the highest proportion of the three areas. The commonest activity was working as a labourer (16%) for the SHCA. Other income-earning opportunities were limited, and most households relied on agriculture for income and subsistence. External flows of resources into the community were somewhat higher in South Viphya than

elsewhere: 24% received seed issued by the government, and 10% received cash and 6% fertilizer from relatives.

Income-Generating Activities

Bembeke. Almost all income-generating activities in Bembeke were based on agricultural and rural products, except 3% of females who sold groceries and 2% of males who were tin smiths. The economy is thus still very dependent on agriculture. The most important activity for women was beer brewing, which contributed most to their total income (58% for wives and 35% for female-headed households). More women than men were engaged in income-generating activities. Some activities such as selling mats and firewood appeared to be gender neutral.

Kalira. Most income-generating activities in Kalira were also based on agricultural and rural products, with a few 'imported' products being sold or repaired. The variety of activities among women was more limited than in Bembeke, with only three activities being reported: beer brewing (46% of wives, 12% of female household heads), baking for sale (4% of wives), and selling second-hand clothes (4% of wives). However, male household heads had a much wider range of income-generating activities, the major activity being mat making (23% of the male household heads).

South Viphya. Overall, income-generating activities were similar to those found in Bemebeke and Kalira. The women's primary sources of income were beer brewing (41% of wives, 25% of female-headed households) and sales of baked products (19% of wives). Male household heads had a much wider range of activities, but all based on activities within the rural economy. Fish farming and brick making were the two most popular income-generating activities (8% each), followed by mat making.

Food and Income Security

Bembeke. A further potential indicator of socio-economic status is the proportion of the sample population who received food aid in 1994/95. In Bembeke, 75% received food aid, indicating not only a high level of need, but also good access to the institutions that provide the food aid. Food aid distribution is often blanketed across communities without much targeting. Those communities like Bemebeke, which are close to paved roads probably receive preferential treatment. Therefore, the recipients of food aid may not necessarily belong to the poorest households in the communities.

Purchasing of maize was almost universal (94%), with the main month for the first buy being either August or October. This is relatively early in the year and indicates a high level of food insecurity. Casual labour (*ganyu*) was common in Bembeke, where 45% reported to have done piece work in the past 12 months, thus indicating low levels of liquidity in the community.

An analysis of the crops grown specifically for cash suggested that within the EPA, markets are developing for agricultural products. The three most important cash crops were tomatoes, soya bean, and beans (Table 2). Tomatoes were shipped to Lilongwe and Blantyre for sale in urban markets, while soya bean, a relatively new crop in Malawi, and thus not commonly processed and directly used by the community, was sold for processing in urban areas.

Table 2. The most important cash crops (%) grown by households in three extension planning areas (EPA), Malawi, 1995.

Crop	Bembeke EPA (n = 72)	Kalira EPA (n = 61)	South Viphya EPA (n = 75)	Total (n = 208)
Beans	36	44	48	43
Soya bean	36	15	0	17
Tomato	24	3	0	9
Tobacco	0	33	3	10
Irish potato	4	5	33	15
Coffee	0	0	16	6

The proximity of Bembeke to the main Lilongwe—Blantyre road and the increasing activities of private traders indicate that opportunities for income generation through agricultural production were developing within the Bembeke EPA. The level of commercialization for agricultural products, however, is low, with many households forced to sell part of their food crop to meet their immediate cash needs.

Kalira. A high proportion of the sample population (64%) received food aid in 1994/95. About 69% needed to buy maize for food. The pattern of maize purchases indicated that some families were forced to purchase maize throughout the year. Shortages began in February and November with 10% of households purchasing in November. *Ganyu* labour was not as common as in the Bembeke EPA; nevertheless, 35% of the sample had worked as such in the past 12 months. However, 17% of the sample also reported that they had employed cash labour over the last 12 months, indicating that a proportion of the sample had sufficient cash, or could not call on community labour to carry out their agricultural tasks, or some households may have suffered shortages of family labour.

The crops that brought the most cash were beans, followed by tobacco. Both these crops have a reasonably long shelf life and do not rely on timely transport and ease of access to markets as do perishable crops. A smaller proportion of the sample population in

Kalira reported producing crops specifically for sale, compared with that in Bembeke, reflecting the Kalira farmers' problems of poor access to markets.

South Viphya. Only 4% of the sample population received food aid and only 60% purchased maize during the year (compared with 94% in Bembeke), indicating that relatively more people met their food requirements from their own production. About 22% of the sample population provided *ganyu* labour in the previous 12 months. At least 21% of households hired labour, suggesting that cash was available for this purpose in some households.

The most important cash crops were beans (35%), Irish potatoes (24%), and coffee (12%). South Viphya's economy, as in Bemebeke and Kalira, is tied to agricultural production and to the institutions created to provide extension and technical advice. The importance of the SHCA's activities in providing some employment opportunities is notable. The very poor road is a major constraint to the growth of markets. Rehabilitation of the road (August 1996) may help reduce transport and transaction costs and encourage the re-establishment of market links. The impact of coffee as a cash crop is of little significance to the area. Poor prices consistently offered by the parastatal has led to bushes being abandoned and a move away from coffee production.

Crops Grown in the Three Surveyed Sites

Rainy season crops. A large range of crops were reported to be grown in the three locations. Table 3 illustrates which crops were grown in the rainy season in 1994/95 and the proportion of the sample population in each area who grew these crops. Maize and beans were clearly predominant. Other important crops included sweet potatoes, tobacco, groundnuts, and Irish potatoes.

The differences between the agro-ecologies, compounded by factors like market access and investment in development institutions, are noticeable. South Viphya's main non-food cash crop is coffee as a result of a long-term investment by a parastatal organization. Maize and beans were the key staples in Bembeke, Kalira, and South Viphya. Tobacco was an important non-food cash crop in Kalira (earning income for 18% of the sample population). In Bembeke, no specific non-food cash crop was grown; soya bean and beans were the most important income-earning crops at 36% each (Table 2), and beans were the most important cash crop in both Kalira and South Viphya.

Dry season (*dimba*) crops. Fewer crops were planted in the dry season (*dimba*), with a greater emphasis on vegetable crops (Table 4), some of which are important sources of income. In Bembeke, bean production was ranked third after tomatoes and cabbages, whereas in South Viphya beans were ranked second after Irish potatoes. These vegetable crops were grown for sale to traders who supplied them to cities like Lilongwe (tomatoes and cabbages from Bembeke) and Mzuzu (Irish potatoes from South Viphya).

Table 3. The crops most commonly grown during the rainy season (%)[a] by extension planning area (EPA), Malawi, 1995.

Crop	Bembeke EPA (n = 123)	Kalira EPA (n = 110)	South Viphya EPA (n = 105)	Total (n = 338)
Local maize	52	37	40	43
Hybrid maize	7	33	41	25
Inter-planted maize	3	8	11	7
Beans	61	57	74	63
Irish potatoes	8	4	32	14
Soya beans	28	16	2	15
Tomatoes	7	1	2	3
Sweet potatoes	11	26	12	16
Rape	1	0	1	1
Cabbage	1	0	2	1
Bananas	0	0	10	3
Coffee	0	0	22	7
Cassava	0	0	17	5
Millet	0	0	8	2
Tobacco	0	20	4	8
Groundnuts	0	13	10	7
Mustard	2	0	0	1

a. The total in each column is more than 100% because more than one crop was identified.

Bean Production Practices in the Surveyed Areas

Bean production practices reflect the variation in agro-ecologies across the three locations, especially with respect to the length of the rainy season and temperatures during the dry (*dimba*) season, and how households adapt their cultural practices to these factors. Although many respondents in all three locations normally planted beans twice a year, all indicated that the most important season for growing beans was the rainy season. Only 4% of respondents from Bembeke suggested that the dry (*dimba*) season was their most important growing season.

Beans, as a crop, are well suited to intercropping, although a range of cropping patterns are used. The two principal cropping patterns reported were monocropping and intercropping. Intercropping was most commonly practised during the rainy season in all the three areas: 90% in South Viphya, 75% in Kalira, and 60% in Bembeke.

Table 4. The crops most commonly grown during the dry season (%)* by extension planning area (EPA), Malawi, 1995.

Crop	Bembeke EPA (n = 123)	Kalira EPA (n = 110)	South Viphya EPA (n = 105)	Total n = 338 (%)
Hybrid maize	0	3	0	1
Inter-planted maize	0	3	0	1
Beans	11	9	22	13
Irish potatoes	11	17	46	22
Tomatoes	41	28	11	29
Rape	11	0	7	7
Cabbage	13	23	14	16
Mustard	13	17	0	11

Farmers reported that the advantage of intercropping during this time of the year was to protect the bean crop from direct rainfall and strong winds, thus reducing the incidence of fungal and bacterial diseases. A second advantage was a more efficient use of fertilizer, as beans were often planted together with maize and thus benefited from the fertilizer applied to the maize crop. However, not many households applied fertilizer to their maize crop, the most being in the South Viphya EPA: 29% applied di-ammonium phosphate (DAP), 17% applied sulphate of ammonia (SA), and 7% applied calcium ammonium nitrate (CAN). The other two EPAs also reported some use of fertilizer but in numbers smaller than 10%. None of the sample population reported applying fertilizer directly to a bean crop, or using pesticides or herbicides.

Monocropping was more common during the dry season, but the area available for planting was limited mainly to valley floors and other low-lying areas where residual moisture from the previous rains had accumulated. While productivity per unit area may be higher from dry season plantings, the total production was limited by land availability. The impact of the dry (*dimba*) season plantings on household food security and income was less than that for the rainy season crops.

The Use of Beans in a Typical Farm Household

Beans play an important role in the diet of most households, and also contribute to their cash income. This is reflected by the sample population regularly growing the crop: 83% in Bembeke, 74% in Kalira, and 90% in South Viphya. Where households did not grow beans, their main reason was the unavailability of seed. Beans were ranked as the second most important crop after maize for household consumption in all the three areas (67% in

Bembeke, 48% in Kalira, and 63% in SouthViphya). In all areas beans were ranked as most important for earning income (35% in South Viphya, 28% in Kalira, and 18% in Bembeke), followed by tobacco (18% in Kalira) and coffee (12% in South Viphya).

Choice of Bean Variety

Detailed information was generated on households' preferences for bean varieties, and data collection on preferences for specific bean varieties was based on the respondents' knowledge of the local names of beans and their seed types. Varieties were classified according to Ferguson et al. (1992) (Appendix 3). Additional information included important characteristics of existing bean varieties, and the most important characteristics farmers would want in new improved varieties.

A clear picture was obtained of the bean varieties preferred by male and female farmers for planting in the rainy and *dimba* seasons. Altogether 12 varieties were reported to be cultivated during the rainy season and 11 varieties in the *dimba* season in the Bembeke EPA. Some differences were observed for requirements between the male and female farmers or household heads. The preferred varieties, in order of preference, were Khaki (Nasaka), Phalombe, Nanyati (sugar beans), Kayera, and Namajengo for the rainy season; and Khaki, Phalombe, and Nanyati for the *dimba* season. The remaining eight varieties were grown only by a few farmers. Female respondents showed a greater preference for Khaki (52%) than did males (35%), although the reasons for the difference remain unclear.

In Kalira, 14 varieties are grown in the rainy season and 9 in the *dimba*. The six most frequently cultivated varieties in the rainy season were Nanyati (sugar beans), Kawale, Phalombe, Khaki (Nasaka), and Salima and Lilongwe both ranking fifth. For the *dimba*, Nanyati, Phalombe, Salima, and Khaki were the preferred varieties. The differences between male and female farmers were not significant.

In South Viphya, nine varieties are grown in the rainy season. The most preferred varieties were Nanyati (sugar beans), followed by Selenje, Nyauzembe, and Saba, but fewer farmers mentioned these varieties as their first or second choice. Six varieties were grown in the *dimba* season, with Nanyati and Selenje being the most popular. Again, as in Kalira, the differences between male and female farmers were not significant.

Preferred varieties for consumption and sale. Respondents were asked to name their most preferred variety and their second choice for consumption. The results were highly varied, indicating that farmers chose many varieties, with the greatest number being mentioned in Bembeke (15) and the smallest in South Viphya (8). In Bembeke, most respondents (94%) indicated a first and/or second preference for Khaki, Phalombe, Nanyati, and Kayera. In Kalira, 65% of respondents chose Kawale, Phalombe, Nanyati, and Lilongwe, and, in South Viphya, 78% selected Selenje and Nanyati.

The varieties preferred for sale were little different from those for consumption.. In Bembeke, four popular varieties were identified for sale: Khaki (Nasaka), Namajengo, Phalombe, and Nanyati (sugar beans). In Kalira, they were Phalombe, Kawale, Khaki, and Nanyati; and in South Viphya, only two varieties were preferred: Selenje and Nanyati (data not shown).

Important characteristics of bean varieties. Farmers were requested to rank the three most important characteristics of bean varieties. The data were analysed by sex of respondent and household head (Tables 4.1 to 4.6 in Appendix 4).

In both Bembeke and Kalira, the most important characteristic reported was high yield, followed by early maturity, good flavour, and good cooking qualities. In Bembeke, farmers gave a list of 13 important characteristics, but seed size was recorded from only one respondent and seed colour was not seen as an important characteristic. In Kalira, male respondents attached greater importance to flavour and cooking qualities, whereas female respondents regarded early maturity as the most important characteristic. Seed size and seed colour were of limited importance. In South Viphya, good flavour was the most important characteristic, followed by high yield, marketability, early maturity, and good cooking qualities. Male respondents were most concerned about flavour and marketing, whereas female respondents expressed preference for yield and early maturity. Seed size was mentioned by 2.5% of respondents and seed colour by less than 1%.

Required characteristics in new improved bean varieties. Farmers were also asked to list, in order of importance, three characteristics of bean varieties that they would like to see incorporated in new improved varieties. The objective was to provide feedback to plant breeders. In Bembeke, farmers mentioned 12 characteristics, the most popular being high yield, followed by early maturity and good flavour. No other characteristic was mentioned by more than 7% of respondents (Tables 5.1 to 5.3 in Appendix 5). Neither were apparent differences in preferences observed between male and female farmers. Farmers in Kalira mentioned 15 important improved characteristics of bean varieties. The most important was high yield, followed by early maturity and pest resistance. No other characteristic gained more than 5% of responses. In South Viphya, of the 13 improved characteristics listed by farmers, high yield was the most important, followed by good flavour, early maturity, good cooking qualities, and resistance to pests or good marketing qualities.

Sources of Seed

The survey confirmed that few farmers in Malawi used formal or market sources to obtain bean seed. Most bean producers relied on informal sources (Table 5). Their own reserves and exchanges between friends, neighbours, and relatives were by far the most common sources of bean seed. The seed cycle through the market system was therefore relatively less important, purchased seed being notably for grain. ADMARC, a parastatal

organization responsible for trading agricultural products and inputs, did not separate beans according to colour or variety until 1996. Most of their stock was, therefore, a mixture of bean varieties.

Table 5. Major sources through which farmers obtain bean seed, according to extension planning area (EPA; %), Malawi, 1995.

Source	Bembeke EPA (n = 109)	Kalira EPA (n = 109)	South Viphya EPA (n = 115)	Total
Own production	46	44	71	179
Friends and relatives	33	33	17	92
ADMARC[a]	8	19	1	32
Private traders	13	4	11	30

a. ADMARC = Agricultural Development and Marketing Corporation.

Private traders and local markets sold beans according to colour, although there was no guarantee that one colour meant one variety. The proportion of the sample population who obtained seed through market channels was, however, relatively small. Nevertheless, these channels performed a vital role in mixing and disseminating bean varieties, and thereby spreading genetic variability across agro-ecological zones, helping to maintain a heterogeneous genetic pool of bean varieties. Of those farmers who purchased bean seed, 18% in Bembeke, 18% in Kalira, and only 5% in South Viphya bought all their bean seed. Most of the respondents purchased no seed at all—Bembeke 52%, Kalira 36%, and South Viphya 65%—emphasizing the reliance on systems based on kind, such as using own seed reserves, exchanging with friends and neighbours, or a combination of reserves and exchange.

Seed Storage

Because the main source of seed is saved at home or received in exchange from neighbours and friends, storage of seed for future planting is vital for future harvests. In Bemebeke, 58% of the sample population saved part of their harvest for seed, and in Kalira 83% and Mphompa 82%. To maintain seed viability, appropriate storage methods are required against fungal infection and especially bruchid (weevil) damage. To preserve their seed against these post-harvest pests, the farmers used a number of indigenous methods as well as the recommended actellic dust (Table 6).

Table 6. Bean storage methods used by farmers, according to extension planning area (EPA; %), Malawi, 1995.

Storage method	Bembeke EPA (n = 123)	Kalira EPA (n = 110)	South Viphya EPA (n = 105)	Total (n = 338)
Sack	10	20	2	11
Sack and ash	31	6	18	15
Sack and actellic dust	38	10	30	22
Sack and tobacco waste	0	51	0	22
Clay pot and cover	5	2	1	4
Clay pot and ash	10	6	36	18
Clay pot and actellic dust	4	0	11	4
Clay pot and tobacco waste	0	4	0	2
Gourd	2	1	2	2
Total	100	100	100	100

Of the traditional storage methods, the use of tobacco waste was common in Kalira. In the other EPAs, the most common non-chemical storage method was the use of ash on beans stored in either clay pots or sacks. In all EPAs, the use actellic dust (a commercial chemical) was common. Use of actellic on beans stored in sacks was more popular than on those stored in clay pots: 38% vs. 4% in Bembeke, 10% vs. 0% in Kalira, and 30% vs. 11% in South Viphya. The methods and problems associated with seed bean storage are similar to those for food beans.

Marketing

Marketing and sale of surplus beans vary according to household consumption needs and cash requirements. In Bembeke, 45% of the sample population reported no sales last season (1994/95), whereas 26% in Kalira and 46% in South Viphya sold 75% of their harvest.

The responsibility for marketing the produce was divided among family members, following the same pattern in all EPAs: male household heads ranked highest, followed by male household heads and their wives, and female household heads (Table 7).

Table 7. Household members who were responsible for selling beans(%).

Seller	Bembeke EPA (n = 78)	Kalira EPA (n = 78)	South Viphya EPA (n = 82)	Total (n = 238)
Male household head	32	62	56	50
Male household head and wife	28	19	17	21
Female household head	22	9	10	14
Wife	18	10	17	15
Total	100	100	100	100

Ferguson et al. (1992) concluded that bean cultivation and the agronomic practices associated with the crop were commonly expressed as women's work, "women farmers are usually those who were most responsible for, and the most knowledgeable about, the crop". However, this survey showed that the responsibility for the sale of the crop was either that of the male household head, or of the male household head and his wife. This suggests that within households, women are less involved in the sale of beans and have less access to, and control of, the sales proceeds.

Dry beans were sold in two ways, either as a mixture of varieties, or as separate varieties sorted according to colour and seed size. In Bemebeke, 18% of the sample population sorted their beans for sale into separate varieties and another 11% sold their beans as mixtures. In Kalira, 42% separated varieties for sale and 19% sold in mixtures and, in South Viphya, 57% separated for sale and 14% sold in mixtures. Most traders bought beans as a generic product, offering equal prices, whether sorted or mixed.

Although farmers reported that the prices received were the same for mixtures as for single varieties, they saw advantages in sorting their product before marketing. The survey did not highlight these advantages, but informal discussions with traders suggested that consumers do have preferences for bean varieties and, when sorted by colour, sales of the favourites increased and stocks of less-favoured colours take longer to sell. Of the sample population, 16% in Bembeke sold their beans to ADMARC—the main market—36% in Kalira, and 57% in South Viphya. The second marketing channel was a network of private traders to whom 12% of the sample population in Bembeke sold, 21% in Kalira, and 27% in South Viphya.

The sample population reported substantial fluctuations between the highest and lowest prices received by farmers in 1994/95. The lowest prices are immediately after harvest in April and May, and the highest prices occur during June/July through December. The price differential in Bembeke indicated a large seasonal fluctuation, with the lowest average price at MK 5.52 per kg, which was only 47% of the highest average price reported

in 1994/95. In Kalira and South Viphya, price differences were not so large but remained significant: 63.0% and 71% of the highest average prices, respectively.

Farmers who had sufficient resources to store their produce for a few months and sold when the price was good benefited substantially from the seasonal price fluctuations. However, very few households could store and sell at a later date. In Bembeke 60%, Kalira 60%, and South Viphya 65% of the sample population reported that they did not store beans to take advantage of higher prices. Cash and food shortages were the two main reasons why farmers could not take advantage of these price differentials.

Household Bean Consumption

Most households, that is, 65% in Bembeke, 50% in Kalira, and 40% in South Viphya, did not produce enough beans to feed their families during 1994/95. Purchasing beans for household consumption was therefore essential for many households: 22%, 25%, and 50% for Bembeke, Kalira, and South Viphya, respectively, of those households who did not produce enough beans. However, a wide discrepancy existed between the numbers of households reporting a deficit and those who could purchase beans for consumption. Friends and relatives were the most important sources where households with inadequate supplies bought their beans: 18% in Kalira, 14% in Bembeke, and 11% in South Viphya. ADMARC was the next most common source of beans bought for household consumption: 10% in Bembeke, 9% in Kalira, and 0% in South Viphya; the last depended (8%) on the local market as a second source.

The frequency with which beans were consumed provided an indication of the importance of crop in the diet of many households. Information was recorded for two periods of the year: after the rainy season harvest (April to September) and later in the season, when food stocks would be low (October to March). The total frequency of consumption varied between the two periods in all three areas. The smallest variation was in South Viphya where 80% of the respondents recorded weekly consumption between April and September, falling by 10% to 70% for the months October to March. The differences were greater in Bembeke (84% vs. 53%) and Kalira (73% vs. 54%) for the April-September vs. October-March periods.

During the deficit season (October-March), 31% of the households in Bembeke, 19% in Kalira, and 10% in South Viphya ate beans less than once a week. At this time of the year, the number of households eating beans every week decreased considerably in all the three areas. Our data supported those reported by Ferguson et al. (1992), that most households consumed beans three times a week, although their data did not differentiate between consumption immediately after harvest and later in the season.

CONCLUSIONS

This survey highlighted the importance of bean cultivation in the farming systems of Malawi. It clearly indicated that beans play an important role in the household's diet and cash income. The survey results also provided further evidence of the extent to which rural households were dependent on agriculture. Farmers experience several major problems associated with bean production:

1. Seed shortages, to the extent that some farmers cannot sow a bean crop;

2. No supplies of certified seed, even from the formal sector;

3. Low yields of traditional varieties (200-600 kg/ha), which result in low bean production for many households;

4. Difficulties associated with storage constrain smallholders from taking advantage of price fluctuations; and

5. Poor market access for many producers, despite a relatively strong demand for beans throughout the country.

The survey also indicated that farmers are responsive to adopting new bean varieties. They had preferred Khaki (Nasaka) and, to a lesser extent, Namajengo, which were both released in 1979. These varieties did not feature prominently in the survey by Ferguson et al. in 1991, but were much more prominent in this survey's results, notably in Kalira and Bembeke. This indicated that a farming community takes time to adopt a new variety. Nasaka, for example, was released in 1979 but its popularity was confirmed only in 1995.

The results highlight significant locational differences regarding preferred bean varieties, a fact that should be recognized by those responsible for breeding new varieties. Smallholders have expressed clear preferences for Khaki and Phalombe (in Bembeke), Nanyati and Kawale (in Kalira), and Nanyati and Selenje (in South Viphya). Regarding desirable characteristics in new bean varieties, characteristics of choice were similar across locations (Table 8). Although yield and early maturity were obviously important, taste or flavour cannot be compromised simply to attain higher yields or an earlier harvest because beans are predominantly grown for consumption.

Ranking of preferences for particular bean varieties suggested that female respondents have greater interest in the agronomic advantages of bean varieties (yield and early maturity) than do men, who expressed preference for flavour and cooking qualities (i.e., varieties that cook fast). This is perhaps a little surprising because women usually

collect firewood and prepare food, so they would be expected to be more interested in such quality characteristics.

Table 8. List of the most desirable characteristics in new bean varieties, according to farmers in three extension planning areas (EPA), Malawi, 1995.

Bembeke EPA	Kalira EPA	South Viphya EPA
Yield	Yield	Flavour
Early maturity	Early maturity	Yield
Flavour	Flavour	Marketability
Good cooking qualities	Good cooking qualities	Early maturity

The role of women as the experts on bean production within the household should be exploited to the full in variety development. The BIP can better understand the farmers' evaluation criteria for such characteristics as flavour, taste, and good cooking quality and marketability. Without doubt, if new varieties that were high yielding and early maturing, and combined good flavour and cooking qualities were made available, they would be acceptable to farmers. They must, however, perform well on farmers' own fields and under their own methods of cultivation.

The adoption time lag needs to be appreciated and built into the BIP's off-station research agenda. Investments in research with farmer groups must be maintained over time to understand adoption and rejection processes.

Although households require higher yielding varieties of beans to improve their nutrition, the role beans play in the commercial economy should not be ignored. The development of beans as a major cash crop is constrained by wider economic factors that affect Malawi's rural economy. These factors include a poor transportation infrastructure that increases private transport costs, therefore making the initial start-up costs in trade very high for entrepreneurs.

With limited competition among bean buyers, purchasers can dictate market prices, thus exposing producers to exploitation by buyers who set prices below market equilibrium. Because no alternative sale channels exist, farmers are obliged to accept these prices. Although some of these issues will be addressed by current attempts to make structural adjustments, the BIP cannot ignore these issues as they will influence its attempts to supply seed where no market for such seed has previously existed and where price differentials appear not to exist between bean varieties.

Given that few producers purchase seed, and that the structural changes required to provide market outlets will take place only in the medium to long term, the BIP needs to investigate the range of non-traditional markets, or exchange and dissemination mechanisms. A key point in any seed system initiative is that the participants acknowledge the difference between seed and grain and that seed is valued above grain. But, as this survey has indicated, with so many smallholders unable to grow sufficient beans to meet their household requirements, new seed varieties are in danger of becoming emergency food or a cash source.

The BIP's research on seed production and dissemination needs to focus on exploring innovative ways with collaborators to enable smallholders to minimize this risk and so help create sustainable, locally based, seed production systems.

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APPENDICES

1. Rainfall Data for the Three Extension Planning Areas (EPA), Malawi, 1995.

Table 1.1. Rainfall data for Bembeke EPA (mm).

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Total (mm)
1984/85							90	1	3	0	0	46	
1985/86	31	92	412	417	207	321	120	0	0	2	0	0	1602
1986/87	14	47	168	325	265	211	42	0	0	0	0	0	1073
1987/88	18	32	115	356	314	213	75	4	0	0	0	0	1127
1988/89	56	45	390	568	282	278	48	14	0	0	10	2	1693
1989/90	2	74	395	231	187	75	34	36	0	0	17	0	1051
1990/91	0	17	141	444	162	145	27	0	0	37	0	4	978
1991/92	15	61	364	206	59	285	1	3	4	0	0	0	997
1992/93	0	18	178	253	323	198	110	0	5	0	1	0	1085
1993/94	24	121	86	317	118	63	25	0	0	1	3	0	757
Mean (mm)	19	53	230	346	213	199	57	6	1	4	3	5	

Table 1.2. Rainfall data for Kalira EPA (mm).

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Total (mm)
1988/89	0	34	169	283	263	520	72	0	0	0	0	0	1341
1989/90	0	54	198	326	233	76	8	22	0	0	0	7	924
1990/91	0	15	186	460	145	249	28	0	0	14	0	0	1097
1991/92	4	43	152	168	88	369	6	24	0	5	9	0	868
1992/93	0	27	148	234	273	204	0	0	0	0	5	0	891
1993/94	0	96	58	274	264	145	36	0	0	3	3	0	879
1994/95	0	2	110	300	200	61	6	-[a]	-[a]	-[a]	0	0	679
Mean (mm)	0.6	39	146	292	209	232	22	8	0	4	2	1	

a. - = No data.

Table 1.3. Rainfall data for South Viphya EPA (mm).

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Total (mm)
1989/90										3	3	0	
1990/91	0	33	59	319	171	246	187	3	0	9	2	0	1029
1991/92	0	110	116	123	210	141	54	13	16	0	1	0	784
1992/93	0	57	71	94	142	262	132	7	15	12	0	0	792
1993/94	0	33	34	231	266	149	35	17	0	1	0	0	766
1994/95	0	19	40	175	228	232	21	6	0	3	2	0	726
1995/96	6	0	104	178	302	296	46	28	8				968
Mean (mm)	1	42	71	187	220	221	79	12	32	5	1	0	

2. Socio-Economic Indicators and Characteristics of the Sample Population Selected from Three Extension Planning Areas (EPA), Malawi, 1995. Values represent numbers and percentages (in parentheses) of farmers.

Table 2.1. Characteristics of the sample population.

Characteristic	Bembeke EPA (n = 123)	Kalira EPA (n = 110)	South Viphya EPA (n = 105)
Male respondents	61 (50)	80 (65)	66 (63)
Female respondents	62 (50)	30 (24)	39 (37)
Household head (male)	40 (33)	62 (56)	53 (50)
Household head and wife	2 (2)	3 (3)	10 (10)
Wife	47 (38)	24 (22)	27 (26)
Other	7 (6)	7 (6)	3 (3)
Female, married with husband on farm	32 (26)	10 (9)	24 (23)
Female, married with husband away	6 (5)	1 (1)	2 (2)
Female, single unmarried	0 (0)	3 (3)	1 (1)
Female, single but married in the past	24 (20)	19 (17)	12 (13)
Male, married with wife on farm	57 (46)	74 (67)	65 (62)
Male, single unmarried	2 (2)	0 (0)	1 (1)
Male, single but married in the past	2 (2)	3 (3)	0 (0)
Mean household size	6	6	7
Received food aid in 1994/95	92 (75)	77 (64)	4 (4)
Did not receive food aid in 1994/95	31 (25)	32 (26)	100 (96)
Worked as *ganyu* labour in 1994/95	55 (45)	38 (35)	23 (22)
Did not work as *ganyu* labour in 1994/95	68 (55)	72 (65)	81 (78)
Able to hire labour in 1994/95	17 (14)	19 (17)	22 (21)
Did not employ cash labour in 1994/95	105 (85)	91 (83)	83 (80)

3. The Ten Most Common Categories of Malawian Common Bean Types, 1995.

1.	CHIMBAMBA:	Dark red, one-coloured, large kidney, bush growth habit. Local names vary by region Includes Chimbamba and Bareta (south), Phalombe and Mkalatsonga Wofiira (centre) and Saba (north).
2.	KAULESI:	Khaki with purple speckles, small or medium, round, climber. Includes Kaulesi (south) and Kablanketi (North).
3.	KAYERA:	White, one-coloured, large kidney, bush; and white, one-coloured, small or medium, climber. Kayera and Kayanga (south and centre), Mkalatsonga Woyera (centre).
4.	NANYATI:	Khaki, variegated red or purple, medium or large, bush or climber. Nanyati (south and centre), Chisoko (centre), sugar beans and Mdyereze (north).
5.	SALIMA:	Light red, one-coloured, medium, bush. Salima (centre).
6.	KAWALE:	Dark red, one-coloured, small or medium kidney, bush or climber Kawale (centre).
7.	CHINZAMA:	Red, one-coloured, medium or large, plump, bush or climber Chinzama, Chibanzi, and Bwenzilaana (centre).
8.	SAPATSANA:	Yellow, one-coloured, large, long, bush. Sapatsana (south and centre), Chiteti (north).
9.	MLALIKI:	Red, one-coloured, very small, climber or bush. Mlaliki, Kamtaugzeni,Kambulembule, Dukutu, and Kamukundali (north).
10.	NYAUZEMBE:	Dark green, one-coloured, medium, round, bush or climber. Nyauzembe (north).

4. Most Important Characteristics of Bean Varieties According to Farmers in the Extension Planning Areas (EPA), Malawi, 1995. Values represent numbers and percentages (in parentheses) of farmers.

Table 4.1. The most important characteristics of bean varieties in the Bembeke EPA, by sex of respondent.

Characteristic	Male	Female	Total
High yielding	33 (27)	33 (34)	66 (30)
Easy to market	8 (7)	5 (5)	13 (6)
Good flavour	30 (25)	14 (14)	44 (20)
Easy to cook	12 (10)	9 (9)	21 (10)
Seed size	1 (1)	0	1 (1)
Good leaves for eating	0	1 (1)	1 (1)
Resists strong winds	0	1 (1)	1 (1)
Grows well with maize	1 (1)	0	1 (1)
Pest resistant	1 (1)	1 (1)	2 (1)
Tolerates poor soils	0	1 (1)	1 (1)
Early maturing	34 (28)	26 (27)	60 (28)
Drought tolerant	0	5 (5)	5 (2)
Late maturing	1 (1)	1 (1)	2 (1)
Total	121	97	218

Table 4.2. The most important characteristics of bean varieties in the Bembeke EPA, by sex of household head.

Characteristic	Male head	Female head	Total
High yielding	25 (28)	13 (33)	38 (30)
Easy to market	5 (6)	3 (7)	8 (6)
Good flavour	22 (25)	7 (18)	29 (23)
Easy to cook	6 (7)	4 (10)	10 (8)
Seed size	1 (1)	0	1 (1)
Resists strong winds	0	1 (3)	1 (1)
Pest resistant	1 (1)	0	1 (1)
Tolerates poor soils	0	1 (3)	1 (1)
Early maturing	27 (31)	7 (18)	34 (27)
Drought tolerant	0	3 (8)	3 (2)
Late maturing	1 (1)	0	1 (1)
Total	88	39	127

Table 4.3. The most important characteristics of bean varieties in the Kalira EPA, by sex of respondent.

Characteristic	Male	Female	Total
High yielding	44 (32)	15 (28)	59 (31)
Easy to market	14 (10)	4 (7)	18 (9)
Good flavour	18 (13)	5 (9)	23 (12)
Easy to cook	15 (11)	2 (4)	17 (9)
Seed size	5 (4)	1 (2)	6 (3)
Good leaves for eating	0	1 (2)	1 (1)
Resists strong winds	2 (3)	2 (4)	4 (2)
Pest resistant	1 (1)	1 (2)	2 (1)
Disease resistant	1 (1)	1 (2)	2 (1)
Early maturing	34 (25)	22 (41)	56 (29)
Good seed colour	2 (1)	0	2 (1)
Stores well	2 (1)	0	2 (1)
Late maturing	1 (1)	0	1 (1)
Total	139	54	193

Table 4.4. The most important characteristics of bean varieties in the Kalira EPA, by sex of household head.

Characteristic	Male head	Female head	Total
High yielding	37 (32)	8 (36)	45 (32)
Easy to market	13 (11)	1 (5)	14 (10)
Good flavour	16 (14)	3 (14)	19 (14)
Easy to cook	11 (9)	1 (5)	12 (9)
Seed size	5 (4)	1 (5)	6 (4)
Good leaves for eating	0	1 (5)	1 (1)
Resists strong winds	2 (2)	0	1 (1)
Pest resistant	1 (1)	1 (5)	2 (2)
Disease resistant	1 (1)	1 (5)	2 (2)
Early maturing	26 (22)	5 (23)	31 (22)
Good seed colour	2 (2)	0	2 (1)
Stores well	3 (3)	0	3 (2)
Total	117	22	139

Table 4.5. The most important characteristics of bean varieties in the South Viphya EPA, by sex of respondent.

Characteristic	Male	Female	Total
High yielding	33 (21)	22 (25)	55 (23)
Easy to market	30 (19)	15 (17)	45 (19)
Good flavour	50 (32)	17 (19)	67 (28)
Easy to cook	15 (10)	9 (10)	24 (10)
Seed size	3 (2)	3 (3)	6 (3)
Good leaves for eating	1 (1)	1 (1)	2 (1)
Good flower onset	0	1 (1)	1 (1)
Pest resistant	3 (2)	1 (1)	4 (2)
Disease resistant	1 (1)	0	1 (1)
Tolerates poor soils	1 (1)	0	1 (1)
Early maturing	18 (11)	13 (15)	31 (13)
Drought resistant	1 (1)	0	1 (1)
Good seed colour	1 (1)	1 (1)	2 (1)
Stores well	1 (1)	1 (1)	2 (1)
Total	158	84	242

Table 4.6. The most important characteristics of bean varieties in the South Viphya EPA, by sex of household head.

Characteristic	Male head	Female head	Total
High yielding	26 (22)	6 (27)	32 (22)
Easy to market	25 (21)	2 (9)	27 (19)
Good flavour	37 (31)	4 (17)	41 (29)
Easy to cook	9 (7)	4 (17)	13 (9)
Seed size	3 (3)	0	3 (2)
Good leaves for eating	1 (1)	0	1 (1)
Pest resistant	3 (3)	1 (4)	4 (3)
Tolerates poor soils	1 (1)	0	1 (1)
Early maturing	13 (11)	4 (1)	17 (12)
Drought resistance	1 (1)	0	1 (1)
Good seed colour	1 (1)	1 (4)	2 (1)
Stores well	1 (1)	1 (4)	2 (1)
Total	121	23	144

5. Improved Characteristics Required of New Bean Varieties by Farmers in the Extension Planning Areas (EPA), Malawi, 1995. Values represent numbers and percentages (in parentheses) of farmers.

Table 5.1. The most important "improved" characteristics required of new bean varieties by farmers in the Bemebeke EPA, by sex of respondent.

Characteristic	Male	Female	Total
High yielding	30 (35)	26 (36)	56 (35)
Easy to market	1 (1)	2 (3)	3 (2)
Good flavour	12 (14)	8 (11)	20 (13)
Easy to cook	3 (4)	7 (10)	10 (6)
Resists strong winds	1 (1)	1 (1)	2 (1)
Pest resistant	6 (7)	3 (4)	9 (6)
Disease resistant	1 (1)	0	1 (1)
Tolerates poor soils	3 (4)	0	3 (2)
Early maturing	23 (27)	18 (25)	41 (26)
Drought tolerant	3 (4)	5 (7)	8 (5)
Good seed colour	3 (4)	1 (1)	4 (3)
Good growth habit	0	1 (1)	1 (1)
Total	86	72	158

Table 5.2. The most important "improved" characteristics required of new bean varieties by farmers in the Kalira EPA, by sex of respondent.

Characteristic	Male	Female	Total
High yielding	35 (36)	9 (39)	44 (36)
Easy to market	2 (2)	2 (9)	4 (3)
Good flavour	5 (5)	1 (4)	6 (5)
Easy to cook	6 (6)	0	6 (5)
Seed size	3 (3)	1 (4)	4 (3)
Resists strong winds	2 (2)	2 (9)	4 (3)
Pest resistant	10 (10)	0	10 (8)
Grows well with maize	2 (2)	0	2 (2)
Disease resistant	2 (2)	1 (4)	3 (3)
Tolerates poor soils	1 (1)	0	1 (1)
Early maturing	21 (21)	5 (22)	26 (22)
Drought tolerant	4 (4)	0	4 (3)
Good seed colour	1 (1)	1 (4)	2 (2)
Stores well	3 (3)	1 (4)	4 (3)
Good growth habit	1 (1)	0	1 (1)
Total	98	23	121

Table 5.3. The most important "improved" characteristics required of new bean varieties by farmers in the South Viphya EPA, by sex of respondent.

Characteristic	Male	Female	Total
High yielding	32 (30)	11 (24)	43 (29)
Easy to market	6 (7)	4 (9)	10 (7)
Good flavour	18 (17)	9 (20)	27 (18)
Easy to cook	4 (4)	7 (16)	11 (7)
Seed size	6 (6)	1 (2)	7 (5)
Good leaf qualities	1 (1)	1 (2)	2 (1)
Resists strong winds	2 (2)	0	2 (1)
Pest resistant	8 (8)	2 (4)	10 (7)
Disease resistant	3 (3)	1 (2)	4 (3)
Tolerates poor soils	1 (1)	0	1 (1)
Early maturing	19 (18)	6 (13)	25 (17)
Drought tolerant	4 (4)	1 (2)	5 (3)
Good seed colour	1 (1)	2 (4)	3 (2)
Total	105	45	150

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