

Commercialisation Bulletin #16

DRY BEANS

Marketing

1

Markets

Markets for dry beans exist both locally, regionally and internationally.

Local consumption is significant since beans are an important food source. Consumption preferences vary from region to region within the country. The predominant demand is for a large seeded 'Kalema' type of bean known popularly as Nambale. The Northern districts prefer a smaller seeded type.

Regional consumption patterns are similar to local requirements with the large seeded types predominating. Demand exists both east and west of Uganda, with the instability in the region fueling demand especially in the west. In addition to commercial trading which is significant cross border, the relief market is also substantial. Demand is for the larger seeded type, although new introductions of smaller seeded materials into this market have met with success in recent times.

The international market has a demand for beans of all types, but importantly for Uganda the white types. These are traded in Europe for the canning industry and in the middle east for both canning and the 'fresh market'. In addition, South Africa has a substantial demand for dry beans. The predominant type required is a sugar type. In demand is a sugar type with a dark speckle and a lighter background (as opposed to the local materials which have the reverse colouring)

2

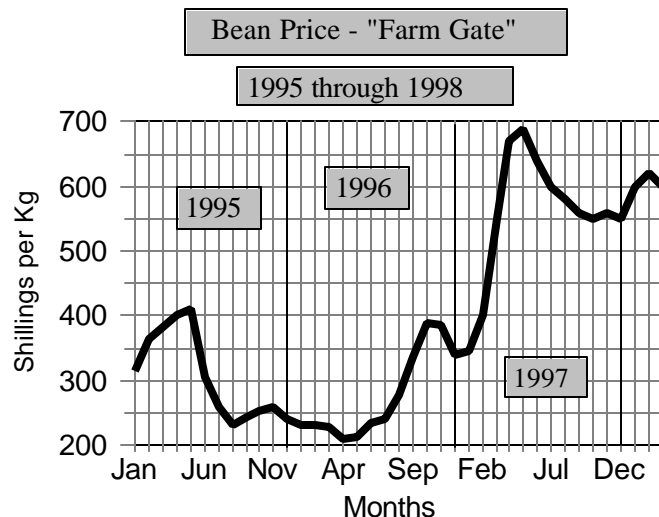
Volumes

Local and regional consumption is significant with internal movements exceeding 100 000 mt per annum. Relief sales have peaked at 30 000 mt in the past and international demand is easily in excess of 20 000 mt per annum provided the quality and price are right.

3

Prices

Local prices generally fluctuate in a band between 200 and 400 US\$ per kg. At these prices, the product is generally competitive with imported product. Prices in the international market for large and small whites fluctuate in band between \$500 and \$700 per mt and for larger whites between \$ 700 and \$1000 per mt. At these prices, exports from Uganda can be competitive.



4

Competition

Competition for regional demand is from imported product mainly from China. Usually this product comes in only when local supply is limiting, since the import parity price is too high. It is only the relief market which traditionally uses this source. On the international market, significant supply comes out of the US and China. Ugandan product can be competitive on the continent and into the middle east. Large whites can be competitive into Europe. The large price band experienced locally works to our disadvantage however since during periods of poor local production, exports can become uncompetitive as local demand is met. This makes sustained entry into the market very difficult.

Production

5

Method**Land Preparation**

Proper seedbed preparation will ensure that your beans have the best chance of performing well. Deep ploughing allows for stronger root development and provides better control of insects. Ideally, the land should be ploughed to a depth of 20 - 30 cm. Advantage should be taken of early rain when cultivating the soil. Ploughing should be followed by harrowing to break up clods and to form a fine seedbed.

Crop Rotation

Occasionally, bush or fallow soil, will be cleared for planting. To reduce weed problems, land should be cleared and cultivated or shallow ploughed before the end of the previous rains. If possible, a green manure crop can be sown such as Mucuna to improve soil nitrogen. A deeper ploughing or cultivation should be done before planting.

It is important that similar crops such as maize, sorghum, and millet do not follow each other, or beans following beans. These crops have similar pests and diseases. Thus, continual cropping encourages a multiplication of

these pests. The result being more crop damage and greater difficulty with pest control. Therefore, try not to plant the same crop in the second season as you planted in the first season.

Planting

Planting must take place at the onset of the rainy season. Plant at between 50 cm x 10 cm to 60 cm x 10 cm. Plant one seed per hill to achieve maximum yield. The final population should be between 180,000 and 200,000 plants per hectare.

Seed requirement vary with bean size. For the larger K20 and K132 - 40 kg per acre (100 kg per ha) and for the smaller K131 - 25kg per acre (60kg per Ha)

Machine planting is possible, but care should be taken to ensure that planting plates fit well so that seed is not damaged. This is especially important with the larger seeded types. If a seed dressing is used, seeds must be allowed to properly dry before putting them into the planter.

Intercropping

Under small scale production methods, beans are often grown with maize and other crops. This may result in poor management of both crops and therefore a reduction in yield of both. It may be better to plant a smaller area to a pure stand of both beans and the other crop than to mix them. If intercropping is practiced, the current recommendation is to plant 2 rows of beans between rows of maize, and to plant them at the same time. In certain cases benefits can be achieved with relay cropping where beans are planted towards the end of the maize crop to maximise the use of extended rains.

Weeding

Two weedings are usually required. One, about 2 weeks after planting and then again just before flowering. This is usually sufficient for good weed control, provided that good crop canopy has been achieved. Avoid weeding during flowering as it can lead to flower drop and a subsequent reduction in yield.

Chemical weed control :

This is possible by using a number of different herbicides. Lasso alone at 3,0 liters per Ha (or Dual at 1.5 L/Ha) is a good grass and soft broadleaf weed killer and will keep the crop weed free under ideal conditions for the first 4 - 6 weeks of the crops life - normally through to flowering.

6 Varieties

K131 - is a small seeded variety that has been tested throughout Uganda. Resistant to common mosaic virus it yields up to 2500 kg/ha.

K132 - is a large seeded red and white mottled variety similar to K20 (Nambale) but it keeps its colour better, giving it a better sales value. This variety yields up to 2000 kg/ha.

K20 - (Nambale) offers a moderate yield of up to 1500 kg/ha, being more sensitive to disease pressure.

Home Kept Seed - Since the most important diseases of bean seed are seed borne, it is essential that seed from a commercial crop not be planted for more than two seasons after purchase. This will result in decreased yields and loss of crop quality. Therefore, buy enough seed for one-third of the proposed plantings each year. Use this seed to plant the next seasons two-thirds and so on.

Varieties for commercial export are being developed through the national bean program. These include, red kidney, white kidney and smaller seeded white navy bean .Commercial quantities of some of these are available.

7

Yield

Bean yields are very variable - they respond well to good management and are affected seriously by poor management. Home saved seed traditionally yields up to about 600 kg per Ha. Improved, disease resistant materials yield well above this with small seeded varieties yielding up to 3 mt per Ha and large seeded type yielding up to 2 mt per Ha.

8

Time to First Harvest/Seasonality/Storage

Harvesting should take place when pods dry and turn brown. Harvesting at this time reduces to a minimum bean deterioration in the field, infestation by insects and losses from physical damage. Drying from 12 to 14 percent moisture content minimizes insect damage during storage brought about mostly by larvae of bean bruchids (weevils) which develop within the seed. The damage which is manifested by hollowed out beans, mouldy beans, and a pungent smell can be controlled by proper storage hygiene, weekly sieving and sunning, or dusting with insecticides such as Actellic 2%. Fumigation with phosphene is also effective.

Commercial shipments of beans - especially for the international market must be kept weevil free. This is impossible in fields where beans have been continuously grown since the pest survives between crops. Crop rotation of one year beans three years other crops is to be strictly adhered to.

9

Pests and Disease Prevention

Diseases

Beans are attacked by a range of diseases caused by bacteria, viruses, and fungi. The most effective control is by use of tolerant varieties. Crop rotation, use of clean seed for planting, effective weed control, burying and burning of infected bean residue, and roguing out of infected plants are additional control measures that one can take. Normally controlling fungal infections in a bean crop is uneconomic, hence the importance of using improved seed.

Pests

The major insect pests of beans are the bean fly and the bean aphid. Damage caused by bean fly shows in stems that swell, split and later rot. In the case of aphids, the sucking effect on the plant causes wilting, dwarfism, flowering/pod abortion and sooty molds. Damage can be controlled by early planting, good plant population, crop rotation, and spraying with chemicals such as Ambush, Fenitrothion, and Dimethoate during the early stage of growth and at flowering.

10

Fertiliser Requirements

Soil fertility varies throughout the country. By continually producing crops and failing to return adequate organic matter to the soil, even Uganda's good soils will become less productive. Yield response of beans to fertiliser is normally moderate when following good management practices. Look at the demonstration plots nearest you to judge for yourself. If the crop follows a fertilised crop, no additional fertiliser should be necessary.

The following is a standard recommendation for the bean varieties covered by this bulletin :

DAP 100 kg/ha. This mix applies 18:46:0 (N:P:K). Apply approximately 4 grams (about one teaspoon) of DAP in the bottom of each planting station, if planting by chop and plant , cover DAP with a little soil before planting the seed. Fertiliser can burn seed if the seed is in direct contact with the fertiliser. If planting by furrow - sprinkle the fertiliser by hand along the planting line.

Application of this planting fertiliser significantly improves initial growth and root development. In conjunction with inoculation with a standard bean rhizobium, yields can be significantly increased.

Commercial plantings of beans by machine are possible with fertiliser placed beneath the planting line. Never mix fertiliser and seed in the same hopper. Use only planters with a dedicated fertiliser attachment.

11

Product Specifications

Product specifications vary from buyer to buyer, but the international relief organisations have the following specifications which provide a guide as to requirements.

Moisture Content	14.0 %
Insect Damaged	2.0%
Broken	2.0%
Shriveled, diseased, discoloured	5.0%
Foreign matter	0.5%
live weevils	No live weevils
Cooking time	90 minutes after soaking

International requirements depend on buyer but may include the following variables

Physical Characteristics	Size Shape Uniformity Seed count (volumetric)
Appearance of canned material after a fixed time.	Bean Breakdown Brine clarity Free starch/clumps
Physical character of beans	Colour Texture Flavour General acceptability

Each of the qualities is given a score to come up with an overall acceptability score. The tolerance for weevil

damage and infection is zero for the international canning and dry bean markets.

12

Packaging

Requirements vary from 50 to 100kg packing in either jute or polypropylene bags.

Investment

13

Cost of Production**Partially Mechanised**

MECHANICAL OPERATIONS	
DISC	21,600
FERTILISE	8,640
PLANT	5,760
HERBICIDE	4,320
CULTIVATE	11,520
HARVEST	21,600
DRYING	32,400
INPUTS	
BEAN SEED (ASSUMING 100 % REPLACEMENT)	60,775
FERTILSER (DAP) @ 120 KG PER HA	68,400
HERBICIDE (DUAL @ 1.5 L PER HA)	15,750
SEED DRESSING ON HOME SAVED SEED	3,725
INSECTICIDE - (AMBUSH @ 0.5 L PER HA)	5,500
INSECTICIDE - (DIMETHOATE @ 0.5 L PER HA)	5,500
TRANSPORT IN	7,135
LABOUR	
HAND CULTIVATION	10,000
CLEANING/BAGGING/ DRYING	8,000
MISCELLANEOUS @ 10%	29,062
TOTAL PRODUCTION COSTS - COMMERCIAL	319,687

14
Profitability

COMMERCIAL BEAN PRODUCTION

PRICE/YIELD GROSS MARGIN MATRIX

'GROSS MARGIN PER Ha ('000 USH)

PRICE '000 USH/MT

		180	200	220	240	260
YIELD (MT/HA)	2.2	112	157	201	245	288
	2.0	80	121	161	201	241
	1.8	49	85	121	157	193
	1.6	17	49	81	113	145
	1.4	-15	13	41	69	97
	1.2	-47	-23	0	25	49
	1.0	-79	-59	-39	-20	0

PRICE/YIELD RETURN TO VARIABLE INPUT

PERCENTAGE ON IN-FIELD INVESTEMENT

		180	200	220	240	260
YIELD (MT/HA)	2.2	140	155	171	186	202
	2.0	129	145	158	172	186
	1.8	118	131	144	157	170
	1.6	106	118	130	142	155
	1.4		105	115	126	136
	1.2				109	118
	1.0					100

OTHER ROTATIONAL CROPS

COMMERCIAL SOYA PRODUCTION

PRICE/YIELD GROSS MARGIN MATRIX

'GROSS MARGIN PER Ha ('000 USH)

PRICE '000 USH/MT

		140	180	220	260	300
YIELD (MT/HA)	2.5	57	156	256	357	456
	2.0		67	146	226	306
	1.8		30	103	174	246
	1.6			58	127	186

1.4		15	71	126
1.2			19	67
1.0				7

PRICE/YIELD RETURN TO VARIABLE INPUT

'PERCENTAGE ON IN-FIELD INVESTEMENT

		140	180	220	260	300
YIELD (MT/HA)	2.5	120	153	187	221	255
	2.0		122	150	177	204
	1.8		110	135	160	184
	1.6			120	142	163
	1.4			105	124	143
	1.2				106	122
	1.0					102

COMMERCIAL GROUNDNUT PRODUCTION

PRICE/YIELD GROSS MARGIN MATRIX

'GROSS MARGIN PER Ha ('000 USH)

PRICE '000 USH/MT

		400	600	800
YIELD (MT/HA)	2.2	432	873	1312
	2.0	350	757	1156
	1.8	280	640	1000
	1.6	205	525	844
	1.4	129	409	689
	1.2	53	292	532
	1.0	-23	176	376

PRICE/YIELD RETURN TO VARIABLE INPUT

'PERCENTAGE ON IN-FIELD INVESTEMENT

		400	600	800
YIELD (MT/HA)	2.2	197	295	394
	2.0	181	271	361
	1.8	164	246	328
	1.6	147	221	274
	1.4	130	195	260

1.2	112	169	225
1.0		142	189

15

Investment Requirements

The capital requirements commercial mechanised bean production are similar to those required for any mechanised operation. The following table gives an indicated cost for such investment.

Machinery Capital Investment Profile

Per Hectare - assuming a plan for double cropping

All costs based on Maize production assumptions - 4 row regime

Partially Mechanised

All costs CIF including duties and taxes with 2 years spares included

60 day turnaround on tillage

CAPITAL ITEM	US\$	
	MECHANISATION	
	PARTIAL	FULL
	UP TO 75 Ha	> 75 Ha
Tractors (0.74 Hp per Ha)	500	325
Machinery - primary tillage	80	34
Secondary Tillage	110	46
Planter/Sprayer/Cultivator/ Trailers etc	120	84
Combine harvester	0	343
Field Dryer/ Farm Storage Unit	45	230
Total Machinery budget /Ha	855	1062
Investment required for 100 Ha unit	85500	106200

In addition - land clearing from virgin or reverted can cost up to \$250/Ha depending on bush density.

More Information**Uganda Seed Project**

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