BEAN RESEARCH PROJECT
P O BOX 220 THIKA
PHONE. THIKA 2022

Report on the National Performance Trials Dry Beans 1980

compiled by

P.O Oluoch and A J G van Gastel

External Report no 61

Acknowledgement

Bean National Performance Trials are a joint exercise of the National Horticultural Research Station (Grain Legume Project) and the National Seed Quality Control Service.

At the various sites, the staff of the Grain Legume Project looked after the experiments.

Oil content and protein content have been analysed by the National Agricultural Laboratories.

Mr. Kimetto and Miss Van Bergen assisted in the analysis of the data.

Mr. Roetman assisted in the establishment and maintenance of the trials.
Mr. Norrenhof assisted in the taking of disease scores.

Experiments were located at various research stations.

Lanet, Thika
August, 1981.

1 INTRODUCTION

Phaseolus vulgaris L which is commonly known as kidney beans, haricot beans, snap beans, garden beans, dwarf beans, field beans, string beans, pole beans or simply as beans originated in Central and South America where, together with maize, they are the most ancient of the cultivated crops (Kaplan 1965) In the 16th Century the Spaniards and the Portuguese took beans to Europe and from there to Africa and various parts of the world (Purseglove 1968) They are believed to have been cultivated in East Africa for about 300 years

Beans are an important food crop that plays a major role in the nutrition of a majority of the population in East Africa by serving as the major source of protein, though the quality of their protein is not as high as that of meat or fish because it is deficient in tryptophan and the sulphur - containing amino acids, methionine and cystein which are essential in human nutrition However, bean protein is very high in lysine which is relatively deficient in maize, rice and potatoes, so when consumed with these staples, as is the custom in Kenya, the mixture does provide a more balanced diet especially for the common citizen who find animal proteins too expensive Thus any efforts made in improving this crop will aid in improving food quality to a large number of people who suffer from malnutrition and starvation In addition to providing the subsistence needs of the grower beans can also be sold for cash as there is normally a big internal demand for beans in towns, hospitals, boarding schools, colleges and prisons

In Kenya, beans are the most important pulse and second to maize in importance as food crop comprising about 763,500 ha, most of which is inter-cropped with maize and/or other crops (Thairu 1979) They are grown extensively in Eastern and Central Provinces and also in Nyanza and Western Provinces The production in the Rift Valley and Coast Provinces is, however, low compared to the other provinces with the bulk of the production in the latter two provinces coming from Elgeyo Marakwet and Taita Hills respectively (Mukunya and Keya 1975) They are grown on a wide range of soil types ranging from loamy sands to heavy clays (Jameson 1970) However, they demand well drained soils with soil acidity preferrably above pH of 5 2 with reasonably high nutrient content (Anderson 1974) They are best suited to the medium altitude zones between 1000 m to 2500 m above sea level and require good and well distributed rains during the entire growing period

Research findings indicate that the average yield of 750 kg/ha for a pure crop and 375 kg/ha for a mixed crop which are normally obtained in farmers fields are well below the potential of this crop as the yields obtained in experiments of the Grain Legume Project carried out in Thika, Embu, Kisii and Kakamega, have occasionally exceeded 4,000 kg/ha in mono cropping bean plots and 1500 kg/ha in plots of beans grown in association with maize These figures clearly indicate that with improved cultural practices, plant breeding and proper and effective control of pests and diseases supported with well organised extension service, enormous improvement in production per unit area of land can be made

The National Performance Trial (Dry beans) which is laid out in various ecological zones where beans are grown has the major aim of providing the best varieties of beans to the farming community However, although this trial is meant for testing potential varieties of beans, some plots are mixed with maize to assess how these potential bean varieties perform both in monocropping and mixed cropping systems since as cited earlier most farmers in the country do not grow beans as a pure crop From these trials, it will therefore be possible to recommend whether a variety of bean should be grown in monocropping or mixed/maize depending on its / it performance in the two cropping systems The potential varieties entered for this trial are normally tested against the already commercialized varieties (standards) for three years, after which any variety which gives consistently high yields during the three years compared to the standard, and is distinct, uniform and stable is finally released to the farming community, However, in some special cases, a potential variety can be released to the farming community before the three-year testing period is over 1980 was the first year that the National Performance Trial (Dry beans) was carried out by the Variety Section of the National Seed Quality Control Service but of course in very close co-operation with our breeders, the Grain Legume Project based at Thika, who have been carrying out this trial in the past

Presented in this report is the data collected in the trials conducted both in the long rains of 1980 and short rains of 1980/81 which together constitute one year of testing

MATERIALS AND METHODS

These were the same for both the long rain and short rain trials unless specified

SITES

The 1980 National Performance Trial (Dry beans) - both long and short rain trials - was laid out in six sites representing major bean growing areas viz

1. National Seed Quality Control Service, Lanet
2. National Horticultural Research Station, Thika
3. Embu Agricultural Research Station, Embu
4. Western Agricultural Research Station, Kakamega
5. Nyanza Agricultural Research Station, Kisii
6. National Dryland Farming Research Station, Katumani

The first three sites represent the medium agricultural potential areas, the fourth and fifth the high agricultural potential areas whereas the last site represents marginal rainfall areas of the country

2 2 ENTRIES

There were eleven potential varieties tested against a standard In Kisii and Kakamega, GLP 2 which is a Rose coco bean was used as the standard, and GLP 24 which is a canadian wonder bean was used as the standard in Ianet, Embu and Thika GLP 1004 which is a "mwezi moja" bean was used as the standard in Katumani The eleven potential varieties tested in 1980 were

1	S T 33	-	Red Rose coco
2	S T 49	-	Canadian wonder
3	S T 92	-	Pinto
4	S T 102	-	Rose coco
5	S T 352	-	Mwezi moja
6	F S 23	-	Mwezi moja
7	F S 44	-	Pinto
8	F S 176	-	Rose coco
9	F S 438	-	Red Canadian wonder
10	F S 442	-	Red Canadian wonder
11	F S 520	-	Zebra

The S T numbers were obtained from Dr D M Mukunya of the Dept of Crop Science, University of Nairobi whereas the F S numbers are local selections from farms Subsequent testing by the Grain Legume Project resulted in their selection for the National Performance Trials (Dry beans)

The maize varieties used in the experiment were

Site	SEASON Long rains	Short rains
Ianet	Medium maturity variety	Katumani maize
Thika	" " "	" "
Kakamega	Late " "	Medium maturing
Embu	Medium " "	Katumani maize
Kisii	Late " "	Medium maturing
Katumani	Katumani maize	Katumani maize

2 3 LAYOUT AND CULTURAL PRACTICES

The design used in both experiments was split - plot replicated four times with the main plot treatments being pure and mixed cropping systems whereas the sub-plot treatments were the twelve bean cultivars The spacing in the pure plots was 50 cm between the rows and 10 cm within the rows There were five rows of 3 6 m length giving a gross plot area of 2 5 m by 3 6 m The two outer rows and the first and last six plants in the three middle rows were left out as guard plants leaving a net plot area of 2 4 m by 1 5 m

In the mixed plots there were five rows of maize spaced 75 cm apart with intra-row spacing of 30 cm giving a gross plot area of 3 75 cm by 3 6 m The two outer rows and the first and last two plants in the three middle rows were left out as guard plants leaving a net plot of 2 25 m by 2 4 m Also in the mixed plots were double rows of beans between the maize rows giving a total of four double rows The spacing here was 25 cm between the rows and 15 cm within the rows Here the two outer double rows and the first and last four plants in the two middle double rows were left out as guard plants giving a net plot of 2 4 m by 1 5 m The net plots were marked at planting and all the data was collected here One bean seed was planted per hole whereas for maize two seeds per hole were planted which were later thinned to one seed per hole

The fertilizer rate for beans in the pure plots was 200 kg/ha of Diammonium phosphate (D A P) i e 36 g per row of 3 6 m applied in the furrow and mixed with soil before planting In the mixed plots, however, 100 kg/ha of D A P i e 27 g per double row was applied For maize, normal recommendation depending on the areas was followed Weed control was done manually and control of pests and diseases was done only in cases where the crop was really in danger e g attack by American boll worms (Heliothis armigera) or cut-worms

2 4 Data collected

a) Plant count - this was done two weeks after emergence and at harvest Only plants in the net plots were counted

b) Vegetative vigour - in the long rain trial this character was scored both at four weeks after emergence and at harvest but in the short rain trial only the former was taken This character was scored on a 0 - 5 scale as follows

0 - very low vigour
1 - low vigour
2 - low to medium vigour
3 - medium to high vigour
4 - high vigour
5 - very high vigour

c) Flowering dates - this character was scored when 50% of the plants in the net plots had at least one flower open and also when the first plant and 100% of the plants in the net plots had at least one flower open

d) Plant type - the potential varieties were scored either as indeterminates or determinates

e) Emergence dates - this was taken when the first plant in a plot emerged and also when 50% of the plants in a plot emerged

f) Disease score - the degree of infestation for each disease was scored when the symptoms were clearly expressed using the following scale

0 - not attacked
1 - very slightly attacked
2 - slightly attacked
3 - medium severely attacked
4 - severely attacked
5 - very severely attacked

g) Pest score - done as for diseases

h) Maturity date - this was taken when 95% of the pods in the net plots were dry

i) Number of pods per plant - in the long rain trial this character was scored on a 0 - 5 scale as follows

0 - very low yielding
1 - low yielding
2 - low to medium yielding
3 - medium to high yielding
4 - high yielding
5 - very high yielding

In the short rain trial, however, three plants from each plot (net plot) were randomly taken and the number of pods recorded This was necessitated by the fact that there was some confusion regarding the scoring of this character in the long rain trial since at some sites the number of pods was recorded instead of using the above scale

j) Pod clearance - three plants in each plot were taken randomly and the distance between the ground level and the lowest pod was measured

k) Number of seeds per pod - five pods were randomly chosen from each plot and the number of seeds in each pod recorded

l) Weight of a hundred seeds - from each plot, two lots of a hundred seeds each were taken and weighed

m) Seed yield - after harvesting the plants in the net plots, the pods were threshed and the seeds cleaned They were then weighed in gm per plot and the weights were later converted into kg per ha

n) Percentage crude protein and % crude oil content - this was determined by taking about 20 g of seeds from the pure and mixed plots separately of each variety and sending to the National Agricultural Laboratories for analysis

3 RESULTS

3 1 General remarks on the sites

In tables 1 - 12, the various characters scored in both trials (long and short rains) at the individual sites are presented In tables 13 - 22 the data obtained over all the sites for each character are presented

3 1 1 Ianet (table 1 and 2) Heavy rains immediately after planting the long rain trial resulted in washing away of seeds from some plots But comparing the stand count obtained at this site both at two weeks after emergence and at harvest with the other sites, it is noticed that this site was still one of the best Some plots also suffered from water-logging during the early stages of growth due to constant rains

In the short rains, however, the trial was severely hit by drought resulting in very poor yields from the bean plots and no yield at all from the maize plots

3 1 2 Thika (table 3 and 4) The yields from this site during the long rains were satisfactory The maize yields were, however, poor due to stalk-borer attack

In the short rains, no maize yields were obtained from this site due to birds Also some varieties which have been tested in this trial were left out by mistake, and unlike in other sites irrigation was done at this site thus making it very difficult to compare data obtained from this site and the other sites

3 1 3 Embu (table 5 and 6) This site was dry planted during the long rainy season and therefore showed the highest number of days from planting to maturity The yields obtained from this site both in the long and short rains were very impressive

3 1 Kakamega (table 7 and 8) This was one of the most impressive sites both in the long and short rains except for a higher incidence of angular leaf spot in both seasons

3 1 5 KISII (table 9 and 10) Although this site represents high agricultural potential areas of the country, the yields obtained in the long rain trial did not reflect this fact because most of the plots especially the pure bean plots were severely attacked by Bean Common Mosaic The short rain trial was, however, one of the best trials

3 1 6 Katumani (table 11 and 12) This site gave the lowest bean yields in the long rains because of severe water stress and the poor stand in some plots The maize stand during this season was also the poorest The site also showed a higher incidence of bean fly compared to the other sites

In the short rains, bean yields from this site were again the lowest due to severe drought Like Ianet, no maize yields were obtained from this site mainly due to severe water stress

3 2 CHARACTERS

3 2 1 Vegetative vigour

It was observed that in both trials S T 33, S T 102 and F S 520 showed the highest vegetative vigour both at four weeks after emergence and at harvest Considering the various sites, Embu seemed to show the lowest vegetative vigour at four weeks after emergence but here we have to be careful since the scoring of this character is rather subjective in that what one gives a four in one site may be a two or a three to another person scoring at another site The vegetative vigour of the beans under the maize was a bit lower than in the pure plots though the difference did not seem to be significant In the short rains, it was also observed that the vegetative vigour was lower compared to the long rains

3 2 2 Days to 50% flowering (table 13) It was observed that ST 92, FS 44, FS 438, FS 442, FS 520, S T 352 and F S 23 flowered earlier than the other varieties S T 49 and F S 176 were late in flowering Considering the various sites, it was observed that in the long rains Kakamega, Kisii and Thika showed the least number of days to 50% flowering In the short rain, however, Katumani showed the least number of days to flowering It was also observed that the pure plots achieved 50% flowering earlier than the mixed plots in both seasons

3 2 3 Days to maturity (table 14) In the long rains, S T 352 and F S 23 were the earliest in maturity whereas S T 49 and F S 176 were late in maturit In the short rains, however, F S 442, S T 352 and F S 23 showed the least number of days to maturity whereas S T 49 and F S 176 matured late as observed in the long rains Considering the sites, Kakamega, Katumani and Thika had the least number of days to maturity in the long rains In the short rains, however, Embu showed the least number of days to maturity whereas Kisii had the highest Considering the two cropping systems, it was observed that the beans in the mixed plots matured earlier than those in the pure lots

3 2 4 Diseases From the tables presented, it is observed that data for some diseases do not appear at all whereas some appear in some sites but not in others This does not mean that these diseases were not scored but is because they did not show up at all or occurred in very limited extent that putting them in the tables was found to be unnecessary The diseases mentioned below were the ones which tended to occur in almost all the sites and in considerable extents

Rust (table 15) In the long rains, this disease was the most prevalent in Lanet, occured to some extent in Thika and Kakamega, did not show up at all in Embu, and only showed up in very limited extent in Kisii and Katumani In the short rains, however, Kakamega showed the highest rust score whereas in Lanet, Kisii and Katumani this disease never showed up at all Comparing the two cropping systems, it was observed that in general, this disease was more prevalent

Angular leaf spot (table 15) In the long rains, this disease was observed in all the sites with Thika, Kakamega and Embu showing the highest scores and Lanet and Katumani showing the lowest scores In the short rains, however, Kakamega showed the highest angular leaf spot score whereas the other sites showed very little or did not show this disease at all

Common blight This disease was noticed in all sites in the long rains with Kakamega showing a slightly higher incidence of this disease In the short rains this disease was not noticed in Lanet, Embu and Katumani showed up very slightly in Thika and Kisii but slightly more in Kakamega

Bean Common Mosaic (table 16) In the long rains, this disease was very severe in Kisii, slight in Kakamega, very slight in Thika and did not appear at all in Katumani, Embu and Lanet

Considering the incidence of the various diseases in pure and mixed cropping systems, it was observed that over the various sites, rust was more prevalent in mixed than in pure plots particularly in the long rains Angular leaf spot, Bean Common Mosaic and Common Blight, however, showed up more in pure than in mixed plots Commenting on the various varieties with regard to their susceptability to diseases at Lanet site, it was observed that S T 102, S T 352 and F S 23 showed the highest rust score For angular leaf spot, again at Lanet, it was observed that S T 92, S T 352 and S T 3 showed the highest scores whereas S T 92 and F S 44 showed the highest Common Blight scores

2 5 Pod clearance (table 17) Regarding this character, S T 33, F S 438 and F S 442 stood out to be the best both in the short rains and in the long rains whereas F S 520 and S T 92 showed the poorest pod clearance in both seasons Considering the various sites, Kisii showed the lowest pod clearance in the long rains whereas Kakamega showed the highest Comparing the two cropping systems, it was observed that in both seasons the pod clearance in the mixed plots was higher than in the pure plots

2 6 Pods per plant In both long and short rain trials, F S 44, F S 102 and S T 92 gave the highest number of pods per plant whereas S T 352 and F S 438 showed the lowest number of pods per plant It was also observed that the mixed plots gave a lower number of pods per plant than the pure plots C nsidering the sites, Katumani showed lower number of pods per plant in the short rains whereas Kakamega showed the highest In the long rains, however, this character did not seem to differ with the various sites

2 7 Number of seeds per pod This character did not seem to vary with the sites or with the various potential varieties entered It was, however, observed that this character was slightly lower in the short rains than in the long rains and also higher in the pure than in the mixed plots

2 8 Plant count The results obtained in the long and short rains both at two weeks after emergence and at harvest do not seem to indicate any differences between the varieties It was, however, observed that Embu and Katumani showed lower stands in the long rains In the short rains, this low stand in Embu and Katumani was not noticed

3 2 9 Seed yield (table 18 and 19) In the long rains, Lanet gave the highest seed yield followed by Embu tum- ni, however, gave the lowest followed very closely by Kisii Of the varieties entered for testing F S 44 gave the highest seed yield both in pure and mixed plots followed by S T 92 S T 49, however, gave the lowest seed yield both in the mixed and pure plots followed by S T 102 and F S 23

In the short rains, F S 44 was still leading in the mixed plots and second in pure plots whereas S T 92 was the leading in the pure plots and second in the mixed plots. The lowest yields in the short rains were shown by F S 442 followed by F S 438 During this season Katumani gave the lowest yields whereas Thika gave the highest mainly because of irrigation in the latter site

3 2 10 Hundred seed-weight (table 20) This character did not seem to vary with the cropping systems in both seasons However, it was higher during the long rains than in the short rains In the long rains, this character was about the same in all the sites except in Katumani where it was lower In the short rains, however, the lowest a hundred-seed-weight was shown by Lanet and the highest by Kisii Regarding the varieties, S T 102, F S 520, S T 352 and F S 23 had the highest a hundred seed-weight in both seasons.

3 2 11 Percentage crude protein and percentage crude oil (table 21 and 22) In the long rains, Embu had the highest percentage crude protein followed by Kisii whereas Thika gave the lowest Considering the varieties, GLP 2 gave the highest percentage crude protein whereas F S 520 gave the lowest Generally, it was also observed that the mixed plots had a higher percentage crude protein than the pure plots

Percentage crude oil was highest in Embu and lowest in Lanet F S 176 gave the highest percentage crude oil whereas GLP 2 gave the lowest

LITERATURE CITED

1. Anderson, G D (1974) Beans responses to fertilizers on Mt Kilimanjaro in relation to soil and climatic conditions E Afr Agric J 39 272 - 286

2 Jameson, J D (1970) Agriculture in Uganda 2nd Ed Oxford University Press 395 p

3. Kaplan, L (1965) Archeology and domestication in American Phaseolus (Beans) Economic Botany, 19, 358 - 368

4 Mukunya, D' and Kenya, S O (1975), Phaseolus bean production in East Africa Cyclostyled paper, Nairobi University, 71 p

5 Purseglove, J W (1968) Tropical crops Dicotyledons vol I Longmans, London

6 Thairu, D M (1979) Grain Legume Production in East Africa with special reference to Kenya Paper presented at the symposium on Grain Legume Improvement in East Africa Nairobi 20 - 2' ugust, 1979, 7

DESCRIPTION OF VARIETIES

(on the base of data obtained in long and short rain season of 1980)

For diseases, the site(s) with the highest diseases incidence is(are) used It should, therefore, be stated that under normal circumstances varieties are not as susceptible as indicated below

ST 33	Days to 50% flowering			medium
	Days to maturity			medium
	Diseases	Angular leafspot		mildly susceptible
		Bean Common Mosaic	pure -	susceptible
			mixed -	fairly resistant
		Rust		fairly resistant
	Pod clearance			good
	Seed yield	long rain -	pure	low
			mixed	low
		short rain -	pure	medium
			mixed	low
	Hundred seed weight			medium to high
	Crude oil content			medium
	Crude protein content			medium
ST 49	Days to 50% flowering			late
	Days to maturity			late
	Diseases	Angular leafspot		fairly resistant
		Bean common mosaic	pure	mildly susceptible
			mixed	fairly resistant
		Rust		fairly resistant
	Pod clearance			poor to medium
	Seed yield	long rain -	pure	very low
			mixed	very low
		short rain	pure	low
			mixed	very low
	Hundred seed weight			low
	Crude oil content			medium
	Crude protein content			high

ST 92	Days to 50% flowering			early
	Days to maturity			medium
	Diseases - Angular leafspot			fairly resistant
	- BCM - pure			very susceptible
	mixed			mildly susceptible
	- Rust			fairly resistant
	- Common blight			
	Pod clearance			very poor
	Seed yield - long rains -		pure	very high
			mixed	very high
	short rains -		pure	very high
			mixed	very high
	Hundred seed weight			medium to high
	Crude oil content			medium
	Crude protein content			low
ST 102	Days to 50% flowering			medium
	Days to maturity			medium
	Diseases - angular leafspot			fairly resistant
	- BCM - pure			mildly susceptible to susceptible
	mixed			fairly resistant
	- Rust			fairly resistant to mildly susceptible
	- Common blight			
	Pod clearance			medium
	Seed yield long rains -		pure	very low
			mixed	low
	short rains -		pure	medium
			mixed	high
	Hundred seed weight			high
	Crude oil content			medium
	Crude protein content			high

ST 352	Days to 50% flowering			early
	Days to maturity			early to medium
	Diseases - Angular leafspot			mildly susceptible
	- BCM - pure			susceptible
	- mixed			resistant to fairly resistant
	- Rust			fairly resistant to mildly susceptible
	- Common blight			susceptible
	Pod clearance			poor to medium
	Seed yield - long rains - pure			medium
	- mixed			medium
	short rains - pure			medium
	mixed			low
	Hundred seed weight			high
	Crude oil content			medium
	Crude protein content			medium

FS 23	Days to 50% flowering			early
	Days to maturity			early to medium
	Diseases - Angular leafspot			mildly susceptible
	- BCM - pure			mildly susceptible
	mixed			fairly resistant
	- Rust			fairly resistant to mildly susceptible
	- Common blight			susceptible
	Pod clearance			poor
	Seed yield - long rains - pure			low
	mixed			low
	short rains - pure			low
	mixed			low
	Hundred seed weight			high
	Crude oil content			medium
	Crude protein content			medium

FS 44	Days to 50% flowering			early
	Days to maturity			medium
	Diseases - Angular leafspot			fairly resistant
	- BCM - pure			very susceptible
	mixed			mildly susceptible
	- Rust			fairly resistant
	- Common blight			mildly susceptible
	Pod clearance			very poor to poor
	Seed yield - long rains -		pure	very high
			mixed	very high
	short rains -		pure	high
			mixed	very high
	Hundred seed weight			medium
	Crude oil content			medium
	Crude protein content			medium

FS 176	Days to 50% flowering			late
	Days to maturity			late
	Diseases - Angular leafspot			fairly resistant to mildly susceptible
	- BCM - pure			susceptible
	mixed			fairly resistant
	- Rust			mildly susceptible
	- Common blight			
	Pod clearance			medium to good
	Seed yield - long rains		pure	very low
			mixed	low
	short rains		pure	low
			mixed	medium
	Hundred seed weight			low
	Crude oil content			high
	Crude protein content			medium

FS 438	Days to 50% flowering		early
	Days to maturity		early to medium
	Diseases - Angular leafspot		mildly susceptible
	BCM - pure		susceptible
	- mixed		fairly resistant
	Rust		mildly susceptible
	Common blight		
	Pod clearance		very good
	Seed yield - long rains -	pure	medium
		mixed	medium
	short rains -	pure	very low
		mixed	low
	Hundred seed weight		medium
	Crude oil content		low
	Crude protein content		medium

FS 442	Days to 50% flowering		early
	Days to maturity		early
	Diseases - Angular leafspot		mildly susceptible
	BCM - pure		susceptible
	mixed		fairly resistant
	Rust		mildly susceptible
	Common blight		
	Pod clearance		very good
	Seed yield long rains -	pure	low
		mixed	low
	short rains -	pure	very low
		mixed	very low
	Hundred seed weight		medium
	Crude oil content		medium
	Crude protein content		medium

PS 520	Days to 50% flowering			early
	Days to maturity			early to medium
	Diseases - Angular leafspot			fairly resistant to mildly susceptible
	BCM - pure			susceptible
	mixed			fairly resistant
	Rust			fairly resistant to mild susceptible
	Common blight			
	Pod clearance			very poor
	Seed yield - long rains -		pure	low
			mixed	medium
		short rains -	pure	low
		-	mixed	high
	Hundred seed weight			high
	Crude oil content			medium
	Crude protein content			medium

GLP 24	Days to 50% flowering			late
	Days to maturity			late
	Diseases - Angular leafspot			resistant
	BCM - pure			
	mixed			
	Rust			farily resistant
	Common blight			
	Pod clearance			very poor
	Seed yield - long rains -		pure	low
			mixed	very low
		short rains -	pure	low
			mixed	low
	Hundred seed weight			low
	Crude oil content			high
	Crude protein content			medium

GLP 2	Days to 50% flowering			medium
	Days to maturity			early to medium
	Diseases -	Angular leafspot		fairly resistant to mildly susceptible
		BCM -	pure	mildly susceptible
			mixed	fairly resistant
		Rust		fairly resistant
		Common blight		
	Pod clearance			poor
	Seed yield -	long rains -	pure	very high
			mixed	very high
		short rains -	pure	medium
			mixed	very low
	Hundred seed weight			high
	Crude oil content			low
	Crude protein content			high

GLP 1004				
	Days to 50% flowering			early
	Days to maturity			early
	Diseases -	Angular leafspot		
		BCM -	pure	
			mixed	
		Rust		
		Common blight		
	Pod clearance			poor to very poor
	Seed yield -	long rain -	pure	very low
			mixed	very low
		short rain -	pure	high
			mixed	high
	Hundred seed weight			high
	Crude oil content			low
	Crude protein content			high

Table 1 Data obtained at the LANET site of the National Dry Beans Performance Trial, during the LONG rains season of 1980. Data in pure and mixed stand are averaged. The GLP number is the standard variety.

(* scored on a 0 - 5 scale)

Entries	Vegetative Vigour*	Days to 50% flowering	Days to Maturity	Diseases *			Pod			Plant count at harvest	Yield							100 seeds wgt. (cms)
											Mixed				Pure			
				Angular leaf spot	Rust	Common blight	Clearance (cms)	Pods/plt	Seeds/ pod		Maize kg/ha	Beans kg/ha	%	Rank	Beans kg/ha	%	Rank	
ST 33	3.8	48	102	1.0	2.2	0.1	5.9	14	3.7	60	3765	1628	109	6	2573	115	4	48
ST 49	3.6	59	109	0.1	1.4	0.2	4.5	13	4.7	60	3006	1259	84	11	1854	183	11	34
ST 92	3.2	44	102	1.8	1.0	0.2	1.1	13	4.5	66	3413	2143	143	2	3461	155	2	46
ST 102	4.6	53	104	0.1	3.5	0.6	2.9	16	3.3	60	2771	1546	103	8	2106	94	10	46
ST 352	4.1	42	100	1.4	3.2	0.2	6.8	9	4.3	64	3500	1590	106	7	2204	99	8	52
FS 23	3.8	40	99	1.1	3.5	0.4	5.7	9	4.2	70	3839	1537	103	9	2120	95	9	50
FS 44	3.6	42	100	0.8	1.4	2.4	2.6	13	5.0	72	3228	2515	168	1	3468	156	1	41
FS 176	3.8	59	108	0.4	3.0	0.4	6.4	13	4.1	60	3515	1207	81	12	1759	79	12	30
FS 438	4.2	43	103	0.8	1.6	0.2	10.4	11	4.3	64	3548	2110	141	4	2266	102	6	49
FS 442	3.7	44	102	0.6	1.2	0.4	9.3	11	4.2	63	3256	1802	120	5	2525	113	5	46
FS 520	4.6	43	103	1.2	2.3	0.2	1.6	13	3.8	58	3419	2116	141	3	2937	132	3	52
GLP 24	3.3	59	110	0.2	1.7	0.2	2.4	14	4.7	58	2612	1498	100	10	2229	100	7	36

Planting date 15/16 April

Harvesting date 5/12 August

Rainfall

April	-	143.6 mmm
May	-	224.6 mm
June	-	80.8 mm
July	-	80.7 mm
August	-	55.8 mm
Total	-	605.5 mm

Seed Yield

F-Value P/M - 22.15**
F-Value Variety - 8.46**
F-Value Interaction - 0.78ns

Table 2 Data obtained at the LANET site of the National Dry Beans Performance Trial, during the SHORT rains season of 1980. Data in pure and mixed stand are averaged. GLP number is the standard variety.

* scored on a 0 - 5 scale

Entries	Vegetative vigour*	Days to 50% flowering	Days to maturity	Pod			Plant count at harvest	Yield						100 Seed weight
				Clearance (cms)	Pods/plant	Seeds/pod		Mixed			Pure			
								Beans Kg/ha	%	Rank	Beans Kg/ha	%	Rank	
ST 33	3.3	50	102	5.0	5	3.0	40	78	56	11	164	114	10	28
ST 49	3.1	53	106	6.2	8	3.1	38	106	76	10	122	85	12	20
ST 92	2.8	46	92	2.6	8	2.6	41	219	158	6	344	239	2	30
ST 102	4.0	48	90	5.2	8	2.8	41	300	216	1	275	191	4	32
ST 352	3.2	42	86	4.6	8	3.3	41	256	184	2	267	185	6	28
FS 23	3.2	42	85	5.7	6	3.0	49	219	158	6	272	189	5	26
FS 44	3.5	44	90	3.3	9	3.0	43	236	170	4	319	222	3	27
FS 176	3.5	53	104	5.0	8	3.3	39	244	176	3	347	241	1	24
FS 438	3.1	44	87	8.4	5	3.8	44	136	98	9	192	133	9	22
FS 442	3.2	44	83	7.8	5	3.8	40	161	116	7	200	139	8	22
FS 520	3.9	46	92	3.4	7	3.7	33	233	168	5	225	156	7	29
GLP 24	2.8	52	103	2.9	5	3.2	34	139	100	8	144	100	11	20

Planting date 5th/6th/7th November 1980.

Harvesting date 12th/23rd February 1981.

Rainfall

November	-	107.9 mm
December	-	3.0 mm
January	-	0.4 mm
February	-	40.5 mm
Total	-	151.8 mm

...ed at the Th... site of the ...tional Dry Beans Performance Trials, during the LONG rains season of 1980. Data in pure and mixed stand are averaged. The GLP number is the standard variety.

* scored on a 0 - 5 scale.

Entries	Vegetative * Vigour	Days to 50% flowering	Days to maturity	Diseases*			Pod			Plant count at harvest	Yield							100 seed weight
											Mixed				Pure			
				Angular leaf spot	Rust	Bean common mozaik	Clearance (in cms)	Pods/ Plt	Seeds/ Pod		Maize kg/ha	Beans kg/ha	%	Rank	Beans kg/ha	%	Rank	
ST 33	4.6	44	97	2.0	1.1	0.2	5.1	9	3.7	76	2982	1334	124	6	2235	107	7	48
ST 49	3.8	48	102	0.8	1.0	0.2	4.5	9	4.5	76	2775	1198	112	8	1724	82	12	35
ST 92	4.8	40	96	1.0	0.3	0.2	2.8	8	4.4	74	2668	2002	187	1	2791	133	1	48
ST 102	4.7	44	98	1.6	1.0	1.1	6.0	9	3.0	77	2379	1084	101	10	2085	98	11	58
ST 352	4.3	41	92	3.0	0.8	0.8	6.6	6	3.6	78	3480	1346	125	5	2380	114	5	52
FS 23	4.2	40	91	3.1	1.0	0.8	5.6	5	4.0	78	2775	884	82	12	2224	106	8	54
FS 44	4.6	40	94	0.8	0.4	0.1	5.2	10	4.5	78	2801	1379	129	4	2552	122	3	42
FS 176	3.9	47	101	1.6	2.2	0.6	3.4	9	4.8	78	2629	1535	143	3	2218	106	9	35
FS 438	4.0	40	93	3.2	1.5	0.2	9.6	7	4.4	76	2914	1090	102	9	2324	111	6	45
FS 442	4.0	41	93	3.2	1.6	0.1	11.4	7	4.4	78	2945	1268	118	7	2427	116	4	43
FS 520	4.9	40	95	2.5	1.0	0.6	5.7	7	3.8	74	2779	1568	146	2	2572	123	2	56
GLP 24	4.0	48	103	1.2	0.8	0.2	4.0	10	4.5	71	3199	1073	100	11	2091	100	10	36

Planting date 14th April 1980

Harvesting date 22nd July 1980 - 21/8/80

Seed Yield

F-Value P/M - 340.65**

F-Value Variety - 6.16**

F-Value Interaction 1.45^{ns}

Data obtained at [illegible] to [illegible] Performance Trials, during the SHORT rains season of 1980. Data in pure and mixed stand are averaged. The GLP number is the Standard variety.

* scored on a 0 – 5 scale

Entries	Vegetative* vigour	Days to 50% flowering	Days to Maturity	Pods			Plant count at harvest	Yield					
				Clearance (in cms)	Pods/ plant	Seeds/ pod		Mixed			Pure		
								Beans kg/ha	%	Rank	Beans kg/ha	%	Rank
ST 33	3.3	44	92	3.9	8	4.0	56	756	96	3	1550	92	4
ST 49	3.6	45	93	2.8	7	4.3	54	508	6[illegible]	6	1595	95	3
ST 92	3.1	37	89	2.6	9	4.0	56	1039	132	1	1878	112	1
ST 102	3.3	44	86	3.4	8	4.0	56	661	84	5	1183	70	6
ST 352	3.3	39	84	3.2	7	4.0	55	669	85	4	1467	87	5
GLP 24	3.0	43	92	1.4	8	4.3	58	789	100	2	1683	100	2

Planting date 12th/13th November 1980

Harvesting date 16th/23rd February 1981.

Table 5 Data obtained at the EMBU site of the National Dry Beans Performance Trial, during the LONG rain season of 1980. Data in pure and mixed stand are averaged. The GLP number is the standard variety.
(* scored on a 0 - 5 scale)

Entries	Vegetative vigour*	Days to 50% flowering	Days to Maturity	Diseases*		Pod		Plant count at harvest	Yield						
									Mixed				Pure		
				Angular leaf spot	Common blight	Pods/plant*	Seeds/pod		Maize kg/ha	Beans kg/ha	%	Rank	Beans kg/ha	%	Rank
ST 33	3.1	62	118	2.4	0.8	13	3.5	39	5023	1452	151	3	2417	89	9
ST 49	3.1	66	127	0.4	0.0	16	4.2	44	4270	1033	108	9	2626	97	6
ST 92	1.5	58	118	0.2	0.6	21	3.8	30	5165	1537	160	2	2230	82	11
ST 102	2.1	61	121	0.2	0.8	15	3.2	30	4634	1097	114	8	2050	75	12
ST 352	2.0	57	108	3.6	3.5	12	3.6	39	4631	922	96	11	2824	104	2
FS 23	2.2	57	108	3.7	3.0	10	3.9	36	792	1149	120	7	2380	88	10
FS 44	1.7	56	115	0.2	0.8	16	3.7	40	4212	1610	168	1	2695	99	5
FS 176	2.8	65	127	0.8	0.3	14	4.3	39	4819	1426	149	4	2428	89	8
FS 438	3.0	60	113	2.6	1.0	10	4.2	42	4418	1210	126	5	3101	114	1
FS 442	2.9	60	112	2.3	0.8	11	4.1	38	3800	1190	124	6	2714	100	4
FS 520	2.6	60	122	1.4	0.8	10	3.6	29	5572	633	65	12	2437	90	7
GLP 24	2.9	66	126	0.6	0.3	14	4.6	36	4518	960	100	10	2717	100	3

Planting date 14th/15th March 1980

Harvesting date 6th/14th August 1980

Rainfall

March	-	27.3 mm
April	-	146.9 mm
May	-	216.3
June	-	4.1
July	-	8.8
August	-	55.3
Total	-	458.7 mm

Seed Yield

F-Value P/M - 105.29^{**}
F-Value Variety - 1.63^{ns}
F-Value Interaction - 2.01^{*}

Table 6 Data obtained at the IITBU site of the National Dry Beans Performance Trials, during the SHORT rain season of 1980 Data in pure and mixed stand are averaged. The GLP number is the standard variety.

(* Scored on a 0 - 5 scale)

Entries	Vegetative vigour *	Days to 50% flowering	Days to maturity	Pod			Plant count at harvest	Yield							100 seed weight
								Mixed				Pure			
				Clearance	Pods/plant *	Seeds/pod		Maize kg/ha	Beans kg/ha	%	Rank	Beans kg/ha	%	Rank	
ST 33	.9	42	81	10.0	8	3.3	57	1500	631	154	8	1239	139		36
ST 49	.8	45	82	5.5	8	3.9	49	2257	358	87	12	950	106	9	26
ST 92	.5	40	78	1.0	10	3.1	53	1946	745	181	3	2345	263	1	36
ST 102	5.0	42	80	0.4	8	2.7	57	1547	683	166	6	1025	115	7	42
ST 352	4.5	40	78	2.8	7	3.4	51	2268	742	180	4	1031	116	6	36
FS 23	4.6	40	78	3.0		3.8	56	2052	722	176	5	1195	134	5	37
FS 44	4.6	40	79	0.0	12	3.0	53	1824	939	228	1	1672	188	2	34
FS 176	4.9	45	83	4.7	9	3.5	50	2007	664	162	7	964	108	8	39
FS 438	4.6	40	78	2.4	8	3.5	56	1804	481	117	9	7711	80	11	29
FS 442	4.4	40	78	6.4	7	3.9	52	1959	496	99	11	575	65	12	28
FS 520	5.0	40	80	1.8	7	3.4	56	2059	850	207	2	1358	153	3	38
GLP 24	4.9	45	82	2.6	9	4.1	47	2285	411	100	10	889	100	10	26

Planting date 4th/9th November 1980 Harvesting date 3rd/10th March 1981

Table 7 Data obtained at the KAKAMEGA site of the National Dry Beans Performance Trials, during the LONG rains season of 1980. Data in pure and mixed stand are averaged. The GLP number is the standard variety. (*scored on a 0 - 5 scale)

Entries	Vegetative vigour*	Days to 50% flowering	Days to Maturity	Diseases*			Pod			Plant count at harvest	Yield							100 seed weight
											Mixed				Pure			
				Angular leaf spot	Rust	Common blight	Clearance	Pods/plant	Seeds/pod		Maize kg/ha	Beans kg/ha	%	Rank	Beans kg/ha	%	Rank	
ST 33	[illegible]	46	90	2.2	3.2	1.3	10.6	3	3.3	75	8358	694	61	8	1704	69	11	37
ST 49	4.4	47	97	1.0	1.0	0.9	9.5	4	4.8	62	6448	462	41	12	1979	80	7	32
ST 92	4.1	38	94	0.[illegible]	1.2	1.1	6.6	4	4.0	66	9104	750	66	[illegible]	2344	95	4	46
ST 102	.5	46	96	0.2	1.2	1.1	12.2	4	3.4	68	7899	568	50	9	1807	73	9	59
ST 352	4.2	40	36	3.0	0.0	2.0	7.2	4	4.1	75	8403	1129	99	2	2145	87	5	49
FS 23	4.2	40	86	3.0	0.0	2.0	7.0	3	4.0	69	8794	742	65	5	2557	103	1	48
FS 44	4.1	38	90	0.4	0.7	1.2	5.3	3	4.4	70	7003	1042	91	3	2357	95	3	46
FS 176	4.5	47	96	1.4	1.8	1.3	13.8	4	4.0	66	8156	515	45	11	1757	71	10	44
FS 38	4.5	41	88	2.6	1.5	1.9	13.6	3	3.8	75	8019	701	62	7	1916	77	8	45
FS 42	4.4	41	86	2.5	2.5	2.0	10.5	3	4.2	72	7999	735	65	6	1986	80	6	41
FS 520	4.4	42	96	1.5	0.3	1.6	7.6	4	3.9	62	9164	516	45	10	1153	47	12	52
GL 2	4.4	43	88	2.0	0.3	1.4	7.4	4	4.0	72	8913	1140	100	1	2480	100	2	54

Planting date 3rd April 1980.

Harvesting date [illegible]th/11th Jul 1980.

Rainfall

April	-	207.5 mm
May	-	270.6 mm
June	-	204.6 mm
July	-	125.3 mm
Total	-	808.0 mm

Seed Yield

F-value P/M	-	781.20**
F-value variety	-	8.33**
F-value interaction	-	1.86ns

Table 8 Data obtained at the KAKA LGA site of the National Dry Beans Performance Trials, during the LONG rain season of 1980 Data in pure and mixed stand are averaged The GLP numbers is the standard variety.

(*scored on 0 - 5 scale)

Entries	Vegatative vigour*	Days to 50% flowering	Days to maturity	Diseases*				Pod			Plant count at harvest	Yield							100 seed weight
				Angular leaf spot	Rust	BCM	Common blight	Clearance	Pods/ plant	Seeds/ pod		Mixed				Pure			
												Maize kg/ha	Beans kg/ha	%	Rank	Beans kg/ha	%	Rank	
ST 33	2.7	46	91	2.4	1.8	1.1	1.2	6.0	8.6	3.8	44	2287	606	89	7	1003	94	6	36
ST 49	2.3	49	96	2.5	1.8	0.4	1.4	4.2	8.7	3.6	39	1880	450	66	11	625	58	12	28
ST 92	1.7	43	92	2.3	2.9	1.9	0.8	3.6	11.9	3.5	40	1918	800	117	4	1211	113	2	35
ST 102	2.6	46	95	2.0	2 2	1.2	1.0	7.0	10.3	3.1	44	1358	995	146	2	1128	105	3	47
ST 352	2.2	42	85	3.0	2.2	1.6	1.4	5.5	7.6	3.7	42	2135	531	78	10	1028	96	5	37
FS 23	2.1	44	86	2.6	2 5	1.6	1.4	3.7	7.0	3.5	42	2396	578	85	8	889	83	8	34
FS 44	2.0	42	91	2.4	2 4	1.1	1.0	5.1	12.9	3.9	46	2020	1014	149	1	1903	178	1	35
FS 176	2.7	48	94	2.5	2.6	1.5	1.4	5.6	8.1	3.6	2	1648	539	79	9	717	67	11	29
FS 238	2.7	45	88	2.6	2 7	1.4	1.1	8.2	8.0	3.7	44	2109	414	61	12	853	80	9	34
FS 412	2.6	45	88	2.5	2 6	1.2	1.3	6.5	7.9	3.8	44	2019	722	106	5	845	80	10	32
FS 520	2.7	46	94	2.6	2.1	1.4	1.0	3.6	10.2	3.9	43	1591	831	122	3	975	91	7	38
GLP 2	2.8	46	90	2.2	2.3	1.2	1.2	5.2	10.1	3.7	46	1385	683	100	6	1070	100	4	43

Planting date 12th/13th September 1980 Harvesting date 10th/24th December 1980.

Table 9 Data obtained at the KISII site of the National Dry Beans Performance Trial, during the LONG rain season of 1980. Data in pure and mixed stands are averaged. Th GLP number is the standard variety.

(scored on 0 – 5 scale)

Entries	Vegetative vigour*	Days to 50% flowering	Days to maturity	Diseases*			Clearance	Pod		Plant count at harvest	Yield							100 seed weight
				Angular leaf spot	BCM	Common blight		Pods/plt*	Seeds/ pod		Mixed				Pure			
											Maize Kg/ha	Beans kg/ha	%	Rank	Beans kg/ha	%	Rank	
ST 33	.8	44	97	2.0	2.4	0.2	3.8	3	3.2	66	7605	72	86	10	1213	97	6	42
ST 49	.6	47	112	1 5	1.9	0.4	1.2	2	3.0	60	72 8	605	72	11	929	74	9	34
ST 92	.7	41	113	1.0	3.4	1.2	1.2	3	3 1	62	7271	1052	126	2	1528	122	2	43
ST 102	.7	44	104	0 5	2.3	0.8	2.0	2	2.9	60	6608	735	88	9	1135	91	8	57
ST 352	9	40	93	2 1	2.0	1 8	3.0	4	3.2	68	7857	758	91	7	1362	109	3	6
FS 23	.8	40	95	1 6	1.9	1.6	2.2	3	3.7	64	4	578	69	12	840	67	10	44
FS 44	.9	41	114	0 8	3.2	1.2	1.3	2	3 9	-	9057	1134	135	1	1697	136	1	42
FS 176	.7	48	110	1 6	2.6	0.4	2.7	3	3.6	69	7037	792	95	6	1151	93	7	34
FS 438	.6	48	95	2 0	2.6	0.2	6.3	3	3.8	64	6815	796	95	4	1243	100	5	42
FS 442	.8	42	95	1.7	2.5	0.2	5.6	3	3.7	62	7574	752	90	8	831	67	11	34
FS 520	4.8	42	104	1 2	2 9	0.4	0.7	3	3.4	61	7113	793	95	5	728	58	12	49
GLP 2	.6	43	97	1.7	1.8	1.3	2.8	3	3.4	68	7718	838	100	3	1248	100	4	52

Planting date 25th/26th March 1980

Harvesting date 17th/19th July 1980

Rainfall

March	–	159.2 mm
April	–	166.2 mm
May	–	288.4 mm
June	–	131.6 mm
July	–	129.8 mm
Total	–	895.2 mm

Seed Yield

F-Value P/M	–	3.68ns
F-Value Variety	–	4.93***
F-Value Interaction	–	1.01ns

Table 10 Data obtained at the KARI site of the Regional Dry Beans Performance Trial, during the SHORT rain season 1980 Data in pure and mixed stands are averaged. The GLP number is the standard variety.

Vegetative vigour and diseases are scored on a 0 - 5 scale.

Entries	Vegatative* vigour	Days to 50% flowering	Days to maturity	Diseases			Pod			Plant count at harvest	Yield							100 seed weight
											Mixed				Pure			
				BCM	Common blight	Pests	Clearance	Pods/plant	Seeds/pod		Maize kg/ha	Beans kg/ha	%	Rank	Beans kg/ha	%	Rank	
ST 33	4.3	47	109	1.2	1.0	1.6	5.2	6.6	3.3	48	4722	514	139	7	1047	110	5	46
ST 79	3.9	50	115	1.8	0.4	0.9	4.6	7.3	3.7	38	4833	700	190	2	975	103	9	40
ST 92	4.0	42	118	2.5	0.5	3.6	4.2	5.5	3.6	46	4389	469	127	9	1106	116	4	46
ST 102	4.6	48	112	1.4	0.8	1.7	5.2	6.0	3.0	40	4907	647	175	5	1195	126	2	56
ST 352	4.3	42	93	0.8	1.0	0.9	3.7	5.0	3.4	48	5574	408	111	11	933	98	11	51
KS 23	4.4	42	103	0.1	1.4	0.4	3.7	4.0	3.5	42	5481	414	112	10	889	94	12	48
KS 44	4.4	42	116	1.8	0.4	1.0	4.0	7.1	4.1	42	5463	642	174	6	1039	109	6	44
KS 176	4.1	51	114	1.9	0.5	1.3	3.8	6.6	3.5	40	4667	739	200	1	1142	120	3	42
KS 438	4.1	42	102	0.8	0.7	0.2	5.2	4.7	4.3	43	4741	695	188	3	1006	106	8	47
KS 442	4.0	43	95	0.6	1.0	0.0	4.8	5.3	4.4	42	5389	511	139	8	1206	127	1	44
KS 520	4.1	44	114	1.6	0.4	1.2	4.2	5.6	4.1	38	4556	658	178	4	1033	109	7	48
GLP 2	4.0	45	107	1.0	1.2	0.3	3.8	4.9	3.3	39	5092	369	100	12	950	100	10	56

Planting date 11th/12th September 1980

Harvesting date 2nd/9th January 1981

Rainfall

September	-	131.7 mm
October	-	95.6 mm
November	-	176.7 mm
December		67.5 mm
January	-	31.0 mm
Total		502 mm

Table 11 Data obtained at the Machakos site of the National Dr. Beans Performance Trial, during the LONG rain season of 1980. Data in pure and mixed stands are averaged The GLP number is the standard variety.
(* Scored on a 0 - 5 scale)

Entries	Vegetative* vigour	Days to 50% flowering	Days to maturity	Disease* Common blight	Pod* Clearance	Pods/plant	Seeds/pod	Plant count at harvest	Yield Mixed Maize kg/ha	Mixed Beans kg/ha	Mixed %	Mixed Rank	Yield Pure Beans kg/ha	Pure %	Pure Rank	100 seed weight
ST 33	4.4	46	96	0.5	6.2	5	3.6	40	956	751	106	10	754	96	12	38
ST 49	4.5	47	102	0.2	3.8	4	4.4	40	1086	743	105	11	958	122	6	28
ST 92	4.8	42	94	0.8	4.4	4	3.2	54	886	1095	155	3	1265	162	1	38
ST 102	5.0	44	97	1.2	6.6	5	3.2	39	759	804	114	8	1069	137	4	40
ST 352	4.7	40	93	0.8	5.8	5	4.1	51	1034	962	136	4	1086	139	3	40
PS 23	4.8	40	92	0.5	6.4	5	3.6	40	1056	955	135	5	847	108	10	42
PS 44	4.9	43	93	1.8	3.6	4	4.0	46	707	1363	193	1	851	109	8	35
PS 176	4.4	48	102	0.8	4.1	4	4.0	42	679	861	122	6	915	117	7	27
PS 438	4.8	43	94	0.7	10.5	4	3.8	46	1328	852	120	7	1053	135	5	36
PS 442	4.4	44	92	0.6	9.6	4	3.9	52	1310	794	112	9	849	108	9	31
S 529	4.9	44	94	0.6	4.2	5	4.2	36	747	1240	175	2	1124	144	2	44
LP 1004	4.5	41	92	0.8	5.7	5	3.9	42	1077	708	100	12	783	100	11	44

Planting date 3rd April 1980

Harvesting date 14th/16th July 1980

Rainfall

April	-	108.5 mm
May	-	89.0 mm
June	-	0.0 mm
July	-	0.6 mm
Total		198.1 mm

Seed Yield

F-Value P/M	-	0.09^{ns}
F-Value Variety	-	1.84^{ns}
F-Value Interaction	-	0.89^{ns}

Table 12 Data obtained at the MACHAKOS site of the National Dry Beans Performance Trial, during the SHORT rain season of 1980. Data in pure and mixed stands are averaged. The GLP number is the standard variety.

Vegetative vigour is scored at a 0 - scale (0= Very low vigour) pods per plant scored at a 0 - 5 scale (0 = very low number of pods per plant).

Entries	Vegetative vigour	Days to 50% flowering	Pod			Plant count at harvest	Yield						100 Seed weight
			Clearance	Pods/plant	Seeds/pod		Mixed			Pure			
							Beans Kg/Ha	%	Rank	Beans kg/Ha	%	Rank	
ST 33	2.5	42	7.0	3.0	2.7	38	53	71	9	264	108	3	32
ST 49	2.5	44	4.4	3.2	2.9	35	83	111	4	111	45	9	24
ST 92	2.3	36	6.4	3.6	2.2	42	111	148	3	103	42	10	35
ST 102	2.9	41	7.4	3.1	2.4	42	72	96	7	144	59	8	34
ST 352	2.6	37	6.4	2.5	2.9	46	42	56	11	314	129	2	31
FS 23	2.6	37	5.3	2.7	3.3	44	78	104	5	239	98	6	35
FS 44	2.7	35	7.6	4.9	2.9	49	117	156	1	361	148	1	30
FS 176	2.8	42	8.8	3.5	2.9	46	114	152	2	217	89	7	22
FS 438	2.6	38	7.2	2.7	3.0	42	31	41	12	144	59	8	28
FS 442	2.5	40	10.0	3.0	3.1	44	44	57	10	247	101	4	34
FS 520	2.9	37	5.4	2.9	3.1	42	58	77	8	111	46	9	25
GLP 1004	2.5	37	4.4	3.2	3.3	42	75	100	6	244	100	5	32

Planting date: 4th/5th November 1980 Harvesting date 3rd February 1981

Table 13 Data obtained on DAYS TO 50% FLO and at the various sites of the National Dry Beans Performance Trial in both the LONG and the SHORT rains season of 1980.

Entries	Cropping system	LONG RAINS							SHORT RAINS							Flowering
		Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	
ST 93	Pure	49	44	62	46	44	48	49	51	45	42	46	47	41	45	Medium
	Mixed	47	44	62	45	44	44	48	48	42	42	46	47	42	44	
ST 9	Pure	59	48	66	47	47	47	52	53	45	45	49	50	44	48	Late
	Mixed	59	48	66	47	47	47	52	53	45	45	49	50	44	48	
ST 92	Pure	45	40	59	38	42	43	44	46	38	39	43	44	35	41	Early
	Mixed	42	40	57	38	40	41	43	45	36	40	43	40	36	40	
ST 102	Pure	55	44	61	46	41	44	49	48	45	42	46	48	41	45	Medium
	Mixed	51	44	61	46	40	44	48	48	43	42	46	48	41	45	
ST 352	Pure	42	40	57	40	40	40	43	43	39	39	43	44	38	41	Early
	Mixed	41	42	57	40	40	39	43	42	39	40	41	40	36	40	
FS 23	Pure	41	40	57	40	40	41	43	42	-	39	44	42	3741	41	Early
	Mixed	40	40	57	40	40	39	43	42	-	40	44	42	37	41	
FS 44	Pure	44	40	56	38	42	43	44	44	-	39	42	42	35	40	Early
	Mixed	40	40	56	38	40	42	43	43	-	41	42	42	35	41	

Table continued next page .....

Table 13 continued.

Entries	Cropping system	LONG RAINS							SHORT RAINS							
		Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	Flowering
PS 176	Pure	59	,6	63	47	48	19	52	53	-	,5	48	52	42	48	Late
	Mixed	59	,8	66	,7	,8	,7	52	53	-	15	48	50	42	18	
PS 38	Pure	14	,0	60	11	42	44	,5	41	-	,0	44	42	38	,2	Early
	Mixed	,2	10	59	,1	,2	42	41	43	-	0	16	,2	38	12	
PS ,,2	Pure	,4	,0	60	11	42	45	15	,1	-	,0	15	,3	,1	,3	Early
	Mixed	44	12	59	,1	,2	13	,5	43	-	10	45	,3	38	,2	
PS 520	Pure	46	,0	59	,2	42	14	16	49	-	10	,6	,,	37	,3	Early
	Mixed	,0	,0	60	,2	42	,4	,5	14	-	0	46	43	37	,2	
GLP* Standard	Pure	59	48	65	43	,3	10		53	45	5	15	4,	38		
	Mixed	59	48	66	43	43	,1		51	,1	,5	,6	,6	36		
Average	Pure	48	12	60	,2	,3	44	,6 3	47	12	11	,5	45	39	43.05	
	Mixed	,6	2	60	,2	,3	13		46	11	,2	45	,,	39		

* In Lanet, Thika and Embu, GLP 21 (late flowering) was used as standard variety,
In Kakamega, and Kisii, GLP 2 (medium flowering) and in Machakos GLP 100, (early flowering)

Table 14 Data obtained for DAYS TO MATURITY at the various sites of the National Dry Beans Performance Trial on both the LONG and the SHORT rain seasons of 1980.

Entries	Cropping system	LONG RAINS							SHORT RAINS						Maturity
		Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	Lanet	Thika	Embu	Kakamega	Kisii	$\bar{x}$	
ST 33	Pure	104	96	118	91	97	99	100	10-	94	83	92	109	96	Medium
	Mixed	101	98	117	90	97	92	99	101	91	79	90	109	94	
ST 49	Pure	110	100	127	98	111	102	108	104	94	83	96	115	98	Late
	Mixed	108	104	127	96	112	102	108	107	92	80	96	115	98	
ST 92	Pure	104	95	118	93	113	99	104	92	91	80	92	118	95	Medium
	Mixed	100	97	118	95	113	89	102	92	87	77	91	119	93	
ST 102	Pure	103	97	120	96	104	98	103	90	85	81	95	111	92	Medium
	Mixed	104	99	122	97	104	96	104	89	86	80	95	113	93	
ST 352	Pure	100	92	108	86	93	98	96	87	84	79	85	93	86	Early to Medium
	Mixed	99	91	108	86	93	88	94	86	84	77	85	93	85	
FS 23	Pure	99	92	108	86	95	96	96	85	-	79	85	103	88	Early to Medium
	Mixed	99	90	108	86	95	88	94	85	-	77	87	103	88	
FS 44	Pure	101	94	117	90	114	96	102	87	-	79	91	116	93	Medium
	Mixed	99	94	113	91	114	90	100	92	-	79	91	116	95	

Table continued next page ..

Table 14 continued.

Entries	Cropping system	LONG RAINS							SHORT RAINS						Maturity
		Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	Lanet	Thika	Embu	Kakamega	Kisii	$\bar{x}$	
FS 176	Pure	110	100	126	96	110	103	107	104	-	83	94	113	99	Late
	Mixed	106	102	128	96	111	100	107	104	-	83	95	116	100	
FS 438	Pure	104	92	113	88	95	96	98	91	-	80	85	102	90	Early to
	Mixed	102	94	113	89	95	92	97	83	-	77	90	102	88	Medium
FS 442	Pure	103	92	116	87	95	96	98	83	-	79	87	95	86	Early
	Mixed	102	94	109	86	95	88	96	83	-	79	90	95	86	
FS 520	Pure	105	94	121	95	104	97	103	92	-	81	93	113	95	Early to
	Mixed	101	96	122	96	104	92	102	92	-	80	95	114	95	Medium
GLP* Standard	Pure	111	101	126	88	97	93		104	91	83	90	107		
	Mixed	108	105	127	88	97	90		102	92	82	91	107		
Average	Pure	104	95	117	91	103	98		93	90	81	90	108		
	Mixed	102	96	117	91	103	92		92	88	79	91	109		

* Standard variety in Lanet, Thika and Embu, CLP 24 (late maturing). In Kakamega and Kisii, GLP 2 (early to medium maturing) and in Machakos GLP 1004 (early maturing).

Table 15 Data obtained on RUST and BEAN COMMON MOSAIC virus at the various sites of the National Dry Beans Performance Trials in both the LONG and the SHORT rain seasons of 1980. Scored on a 0 - 5 scale.
0 = not attached 5 = very severely attached.

Entries	Cropping system	RUST						BEAN COMMON MOZAIC			
		LONG RAINS				SHORT RAINS		LONG RAINS		SHORT RAINS	
		Lanet	Thika	Kakamega	Kisii	Kakamega		Kakamega	Kisii	Kakamega	Kisii
ST 33	Pure	2.0	1.0	2.6	0.4	1.9	fairly	1.5	3.3	1.1	1.1
	Mixed	2.5	1.2	3.8	0.3	1.8	resistant	0.8	1.4	1.1	1.4
ST 49	Pure	1.5	1.1	1.2	0.5	2.0	fairly	0.8	2.7	1.5	2.3
	Mixed	1.2	0.9	0.9	1.1	1.6	resistant	0.6	1.1	1.4	1.4
ST 92	Pure	0.8	0.4	1.5	0.9	2.9	fairly	0.8	4.2	1.9	3.1
	Mixed	1.2	0 2	0.9	0.6	2.9	resistant	0.1	2.5	1.9	1.9
ST 102	Pure	3.5	0.8	1.1	0.2	2.3	fairly resistant to	1.1	3.0	1.4	1.5
	Mixed	3.5	1.1	1.2	0.2	2.1	mildly susceptible	0.1	1.6	1.1	1.3
ST 352	Pure	2.8	0.8	0.0	0.6	2.1	fairly resistant to	1.8	3.1	1.6	0.8
	Mixed	3.5	0.8	0.0	0.5	2.3	mildly susceptible	0.0	1.0	1.5	0.8
FS 23	Pure	3.0	1.0	0.1	0.7	2.1	fairly resistant to	1.6	2.6	1.5	0.9
	Mixed	4.0	1.0	0.0	0.5	2.8	mildly susceptible	0.8	1.2	1.6	1.0
FS 44	Pure	1.6	0.4	0.9	0.5	2.4	fairly	0.8	4.2	1.1	2.3
	Mixed	1.2	0.3	0.5	0.1	2.4	resistant	0.3	2.2	1.1	1.2

Table continued next page....

Table 15 continued

ntries	Cropping system	RUST						BEAN COMMON MOZAIC			
		LONG RAINS				SHORT RAINS		LONG RAINS		SHORT RAINS	
		Lanet	Thika	Kakamega	Kisii	Kakamega		Kakamega	Kisii	Kakamega	Kisii
'S 176	Pure	2.9	2.4	1.6	0.6	2.5	mildly	0.6	3.5	1.6	2.4
	Mixed	3.0	2.1	2.1	0.9	2.6	susceptible	0.6	1.6	1.4	1.4
FS 438	Pure	1.8	1.4	2.0	0.4	2.8	mildly	1.6	3.5	1.3	1.2
	Mixed	1.4	1.6	3.0	0.2	2.5	susceptible	0.8	1.6	1.4	0.5
FS 442	Pure	1.1	0.9	1.8	0.2	2.5	Mildly	1.5	3.4	1.3	0.8
	Mixed	1.2	2.2	3.2	0.5	2.3	susceptible	0.6	1.6	1.2	0.5
FS 520	Pure	2.1	1.0	0.5	0.4	2.1	fairly resistant to	1.1	3.9	1.4	2.3
	Mixed	2.5	0.9	0.1	0.1	2.1	mildly susceptible	0.7	1.9	1.3	1.0
GLP* standard	Pure	1.5	1 1	0.2	0.3	2.0		1.0	2.5	1.3	1.2
	Mixed	1.9	0.4	0.4	0.2	2.6		0.0	1.1	1.0	0.7
Average	Pure	2.1	1.9	1.2	0.5	2.3		1.2	3.4	1.4	1.7
	Mixed	2.3	2.1	1.4	0.5	2.3		0.5	1.6	1.4	1.1

Standard in Lanet is GLP 24 (fairly resistant to rust)

Standard in Kakamega and Kisii GLP 2 (fairly resistant to rust).

Table 16 continued ....

Entries	cropping system	LONG RAINS						SHORT RAINS		
		Lanet	Thika	Embu	Kakamega	Kisii	Machakos	Kakamega	Kisii	
FS 176	Pure	0.5	1.7	0.9	1.1	1.7	0.0	2.6	0.1	fairly resistant to mildly susceptible
	Mixed	0.2	1.5	0.6	1.6	1.5	0.6	2.4	0.1	
FS 438	Pure	1.1	3.2	3.0	2.6	2.0	0.1	2.6	0.1	mildly susceptible
	Mixed	0.6	3.2	2.2	2.5	1.9	0.1	2.6	0.4	
FS 442	Pure	0.6	3.7	2.2	2.6	1.4	0.4	2.6	0.1	mildly susceptible
	Mixed	0.7	2.6	2.4	2.4	2.0	0.0	2.4	0.8	
FS 520	Pure	0.7	2.6	1.9	1.4	1.1	0.2	2.6	0.5	fairly resistant to mildly susceptible
	Mixed	1.4	2.4	1.0	1.6	1.2	0.2	2.6	0.8	
GLP* standard	Pure	0.2	0.7	0.6	1.9	1.5	0.0	1 9	0.7	
	Mixed	0.1	1.6	0.5	2.2	1.9	0.2	2.4	0.4	
Average	Pure	0.7	2.2	1.8	1.6	1.5	0.2	2.5	0.2	
	Mixed	0.9	1.9	1.5	1.7	1.4	0.2	2 4	0.5	

* Standard varieties in Lanet, Thika and Embu, GLP 24 (resistant). In Kakamega and Kisii, GLP 2 (fairly resistant to mildly susceptible). In Machakos GLP 1004 was the standard variety.

Table 17. Data obtained on POD CLEARNCL (dms) at the various sites of the National Dry Beans Performance Trial **in both** the LONG and the SHORT rain seasons of 1980.

tries	Cropping system	LONG RAINS						SHORT RAINS							
		Lanet	Thika	Kakamega	Kisii	Machakos	$\bar{x}$	Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	
F 33	Pure	7.1	5.7	10.9	2.5	4.8	6.2	3.7	4.9	6.8	6.7	5.0	7.1	5.7	
	Mixed	4.7	4.5	10.4	5.1	7.5	6 4	6.3	2.9	13.1	5.4	5.3	6.9	6.7	good
F 49	Pure	3.3	4.8	7.8	1.2	3.0	4.0	4.9	4.5	3.9	1.6	4.7	4.7	4.1	poor
	Mixed	5.7	4.2	11.2	1.2	4.7	5.4	7.5	1.2	7.1	6.8	4.4	4.1	5.2	to medium
F 92	Pure	0.7	1.8	5.5	0.5	1.2	1 9	1.9	2.5	0.3	4.1	4.4	5.3	3.1	very
	Mixed	1.5	3.9	7.8	1.8	7.7	4.5	3.4	2.8	1.7	3.1	3.9	7.4	3.7	poor
T 102	Pure	2.0	7.7	8.0	2.2	7.4	5.5	4.8	4.5	0	8.4	4.4	8.3	5.1	
	Mixed	3.8	4.2	16.5	1.7	5.9	6.4	5.5	2.4	0.9	5.7	5.9	6.5	4.5	medium
T 352	Pure	5.9	7.0	6.4	1.5	4.0	5.0	3.8	4.1	1.4	6.0	3.1	6.0	4.1	poor
	Mixed	7.8	6.2	7.9	4.4	7.7	6.8	5.3	2.4	4.2	5.0	4.3	6.8	4.7	to medium
S 33	Pure	3.9	8.6	7.8	0.6	6.3	5.4	5.5	-	1.3	2.7	3.6	5.1	3.6	
	Mixed	7.5	2.6	6.1	3.9	6.5	5.3	5.9	-	4.7	4.7	3.8	5.5	4.9	poor
S 44	Pure	0.6	5.6	5.2	0.3	1.8	2.7	3.0	-	0	4.3	3.1	9.3	4.0	very poor
	Mixed	4.6	4.7	5.4	2.3	5.7	4.5	3.6	-	0	5.9	4.7	5.9	4.0	to poor

Table continued next page .. . .

Table 16. Data obtained on ANGULAR LEAF SPOT at the various site of the National Dry Bean Performance Trial in both the LONG and the SHORT rain seasons of 1980. Scored on a 0 - 5 scale.

0 = not attacked, 5 = very severely attacked

Entries	Cropping system	LONG RAINS						SHORT RAINS		
		Lanet	Thika	Embu	Kakamega	Kisii	Machakos	Kakamega	Kisii	
ST 33	Pure	0.7	2.0	2.6	2.1	2.0	0.0	2.5	0.2	mildly susceptible
	Mixed	1.2	1.9	2.2	2.2	2.0	0.0	2.4	0.4	
ST 49	Pure	0.1	0.9	0.8	1.0	1.6	0.0	2.6	0.1	fairly resistant
	Mixed	0.1	0.7	0.1	1.0	1.4	0.1	2.4	0.9	
ST 92	Pure	1.6	1.0	0.0	0.5	1.0	0.1	2.3	0	fairly resistant
	Mixed	2.0	0.9	0.4	0.4	1.1	0.1	2.3	0	
ST 102	Pure	0.1	2.1	0.4	0.3	0.6	0.5	1.9	0	fairly resistant
	Mixed	0.0	1.0	0.0	0.2	0.4	0.5	2.0	0.1	
ST 352	Pure	1.5	3.1	3.8	3.1	2.4	0.2	2.9	0.8	mildly susceptible
	Mixed	1.2	2.9	3.4	3.0	2.0	0.3	3.0	0.8	
BS 23	Pure	1.1	3.1	3.4	3.1	1.8	0.2	2.8	0.5	mildly susceptible
	Mixed	1.0	3.1	4.0	3.0	1.5	0.5	2.5	1.1	
FS 44	Pure	0.2	1.0	0.4	0.3	0.7	0.1	2.5	0	fairly resistant
	Mixed	1.4	0.6	0.1	0.4	0.9	0.0	2.3	0.1	

Table continued next page.....

Table 17 continued ....

Entries	Cropping system	LONG RAINS						SHORT RAINS							
		Lanet	Thika	Kakamega	Kisii	Machakos	$\bar{x}$	Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	
FS 176	Pure	5.4	3 7	9.7	1.5	3.4	4.7	4.0	-	2.8	6.3	3.3	7.5	4.8	medium
	Mixed	7.5	3.0	17.9	3.9	1.8	7.4	5.9	-	6.6	4.9	4.4	10.1	6.1	to good
FS 238	Pure	8.4	12.1	12.3	4.6	8.4	9.2	6.4	-	0.4	7.7	4.8	7.6	5.4	very
	Mixed	12.5	6 7	14.8	8.0	12.6	10.4	10.3	-	4.4	8.8	5.6	6.8	7.2	good
FS 242	Pure	8.4	13.1	9.3	4.1	8.4	8 7	6.2	-	4.8	6.2	4.3	7.5	5.8	very
	Mixed	10.2	9 8	11.7	7.2	10.9	9.9	9.5	-	7 9	6.8	5.3	12.5	8.4	good
FS 520	Pure	0.5	5 5	5.7	0.9	3.4	2.2	1.8	-	2 7	3.5	3.9	3.7	3.1	very
	Mixed	2.8	5.9	9.6	0.5	4.9	4 7	4.9	-	0 9	3.8	4.5	7.0	4.2	poor
GLP* Standard	Pure	0.7	5 9	5.9	1.3	5.8		2.2	1.8	0.8	5.8	3.7	4.0		
	Mixed	4.2	2.0	9.0	4.2	5.6		3.6	1.1	4.5	4.6	3.9	4.8		
Average	Pure	4.2	6.9	8.1	1.8	4.7	11.72	4.2	4.1	2.2	5.2	4.1	6.6	9.5	
	Mixed	6.2	5.1	10.8	3.6	7.2		6.2	2.3	4.7	5.5	4.7	7.2		

* GLP 24 (standard in Lanet, Thika and Embu) has a very poor pod clearance, GLP 2 (standard in Kakamega and Kisii) has a poor pod clearance, GLP 1004 (Machakos) poor to very poor pod clearance.

Table 18 Data obtained on BEAN SEED YIELD (kg/ha) at the various sites of the National Dry Bean Performance Trial in the LONG rains season of 1980.

Entries	Cropping system	LONG RAINS							PURE		MIXED		YIELD
		Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	%	Rank	%	Rank	
ST 33	Pure	2573	2235	2417	1704	1213	754	1816	95	8			low
	Mixed	1628	1334	1452	694	724	751	1097			100	7	
ST 49	Pure	1854	1724	2626	1979	929	958	1678	88	13			very low
	Mixed	1259	1198	1033	462	605	743	883			80	13	
ST 92	Pure	3461	2791	2230	2344	1528	1265	2270	119	2			very high
	Mixed	2143	2002	1537	750	1052	1095	1430			130	3	
ST 102	Pure	2106	2085	2050	1807	1135	1069	1709	89	11			pure=very low
	Mixed	1546	1084	1097	568	735	804	972			89	11	mixed=low
ST 352	Pure	2204	2380	2824	2145	1362	1086	2000	105	4			medium
	Mixed	1590	1346	992	1129	758	962	1130			103	5	
FS 23	Pure	2120	2224	2380	2557	840	847	1778	93	10			low
	Mixed	1527	884	1149	742	578	955	974			89	10	
FS 44	Pure	3468	2552	2695	2357	1697	851	2270	119	1			very high
	Mixed	2515	1379	1610	1048	1134	1363	1507			137	1	
FS 176	Pure	1759	2218	2428	1757	1154	915	1705	89	12			pure=very low
	Mixed	1207	1535	1426	515	792	861	1056			96	9	mixed=low
FS 438	Pure	2266	2324	3101	1916	1243	1053	1984	104	5			medium
	Mixed	2110	1090	1210	701	796	852	1126			103	6	

Table continued ne t page ....

Table 18 continued ....

Entries	Cropping system	LONG RAINS							PURE		MIXED		
		Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	%	Rank	%	Rank	
FS 442	Pure	2525	2427	2714	1986	831	849	1889	99	6			
	Mixed	1802	1268	1190	735	752	794	1090			99	8	low
FS 520	Pure	2937	2572	2437	1153	728	1124	1825	96	7			pure=low
	Mixed	2116	1568	633	516	793	1240	1144			104	4	mixed=medium
GLP * standard	Pure	2229	2091	2717	2480	1248	783	1911	95	9	94	12	GLP 24
	Mixed	1498	1073	960	1140	838	708	1098	117	3	136	2	GLP 2
									80	14	77	14	GLP 1004
Average	Pure	2479	2321	2536	1946	1151	979						
	Mixed	1769	1335	1212	714	92	947						

Table 19 Data obtained on BEAN SEED YIELD (kg/ha) in the SHORT rain season of 1980.

Entries	SHORT RAINS							PURE		MIXED		Yield
	Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	%	Rank	%	Rank	
ST 33	164	1550	1239	1003	1047	264	878	108	4			P = medium
	78	756	631	606	514	53	440			107	8	M = low
ST 49	122	1595	950	625	975	111	730	90	9			P = low
	106	508	358	450	700	83	368			89	14	M = very low
ST 92	344	1878	2345	1211	1106	103	1165	143	1			
	219	1039	745	800	469	111	564			137	2	very high
ST 102	275	1183	1025	1128	1195	144	825	102	7			P = medium
	300	661	683	995	647	72	560			136	3	M = high
ST 352	267	1467	1031	1028	933	314	840	103	6			P = medium
	256	669	742	531	408	42	441			107	7	M = low
FS 23	272	-	1195	889	889	239	697	86	11			
	219		722	578	414	78	402			97	10	low
FS 44	319	-	1672	1903	1039	361	1097	130	2			P = high
	236	-	939	1014	642	117	590			143	1	M = very high

Table continued next page.. ... ...

Table 19 continued..

Entries	SHORT RAINS							PURE		MIXED		Yield
	Lanet	Thika	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	%	Rank	%	Rank	
WS 176	347	–	9[illegible]	717	1142	217	677	83	12			P = low
	244	–	664	539	739	114	460			111	6	M = medium
PS 438	192	-	711	853	1006	144	581	72	14			P = very low
	136	–	481	414	695	31	411			100	9	M = low
PS 442	200	–	575	855	1206	247	615	76	13			
	161	–	406	722	511	44	369			89	13	very low
PS 520	225	–	1358	975	1033	111	740	91	8			P = low
	233	–	850	831	658	58	526			127	4	M = high
GLP standard	144	1683	889	1070	950	214	812	87	10	97	11	GLP 2
	139	789	411	683	369	75	413	105	5	93	12	GLP 2
								128	3	129	5	GLP 100
Average	248	1535	1188	1016	1052	205	874					
	199	727	656	842	582	73	496					

Table 20 Data obtained on 100 SEED WEIGHT at the various sites of the National Dry Beans Performance Trials, in both the LONG and the SHORT rain season of 1980.

Entries	Cropping system	LONG RAINS						SHORT RAINS						
		Lanet	Thika	Kakamega	Kisii	Machakos	$\bar{x}$	Lanet	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	
ST 33	Pure	50	6	34	42	36	1	27	33	34	42	38	35	medium to high
	Mixed	46	9	40	43	39	4	30	38	37	49	27	36	
ST 19	Pure	34	33	32	33	25	32	22	26	25	38	23	27	low
	Mixed	35	37	33	35	30	34	19	27	30	3	24	29	
ST 92	Pure	48	7	44	3	37	4	30	35	32	4	39	36	medium to high
	Mixed	5	9	48	3	38	5	30	36	38	47	31	36	
ST 102	Pure	7	59	53	58	40	51	31	38	47	51	34	40	high
	Mixed	45	57	65	56	40	52	33	45	46	61	34	44	
ST 352	Pure	52	52	48	44	38	47	29	33	32	51	35	36	high
	Mixed	51	52	50	48	43	49	27	38	35	51	27	34	
FS 23	Pure	54	56	50	42	39	8	27	33	33	50	35	36	high
	Mixed	46	52	47	45	43	7	24	41	35	4	35	36	
FS 44	Pure	41	40	48	-	34	0	28	32	34	44	32	34	medium
	Mixed	1	3	44	1	36	1	26	36	36	5	28	34	

Table continued ne t page .....

Table 20 continued . .

Entries	Cropping system	LONG RAINS						SHORT RAINS						
		Lanet	Thika	Kakamega	Kisii	Machakos	$\bar{x}$	Lanet	Embu	Kakamega	Kisii	Machakos	$\bar{x}$	
RS 176	Pure	29	33	47	32	26	33	24	31	28	42	27	30	low
	Mixed	31	37	40	36	28	3.	25	27	30	43	1	29	
FS 438	Pure	50	45	43	41	36	36	22	27	33	46	29	31	medium
	Mixed	48	45	47	42	37		21	31	34	48	28	32	
FS 442	Pure	47	2	40	30	30	38	22	26	28	42	30	30	medium
	Mixed	45	4	42	39	32	40	21	29	35	46	37	3	
FS 520	Pure	54	52	47	46	44	49	29	35	37	46	30	35	high
	Mixed	51	61	56	52	43	53	29	40	40	51	20	38	
GLP* Standard	Pure	37	3-	54	49	44		21	25	42	52	33		
	Mixed	35	38	53	56	45		20	27	44	60	31		
Average	Pure	46	46	44	41	35	43.2	26	32	33	49	32	34.2	
	Mixed	44	48	47	44	37		26	35	36	48	29		

GLP 24 has a low 100 seed weight, GLP 2 and GLP 1004 has high 100 seed weight.

Table 21 Data of GUDE OIL obtained in the National Dry Bean Performance Trial, at the various sites, LONG rain season 1980.

Entries	Cropping system	Lanet	Thika	Embu	Katumani	Kisii	Kakamega	Mean		
ST 33	P	1.32	1.47	1.98	0.75	1.36	1.1	1.34	2.55	
	M	1.16	1.34	1.58	1.01	1.32	0 85	1.21	1.28	high
ST 9	P	1.05	1.60	1.95	0.84	1.37	1.57	1.40		
	M	1 19	1.52	1.05	0.63	1.30	1.36	1.17	1.26	high
ST 92	P	1.12	1.54	2.01	0.53	1.31	1.80	1.38		
	M	1.13	1.30	1.61	1.30	1.46	0.91	1.28	1.33	high
ST 102	P	1.04	1.51	1.54	1.1	1.27	0.53	1.17		
	M	1.06	1.35	1.76	1.71	1.67	1.48	1.50	1.34	high
ST 352	P	0.89	1.25	1.65	1.26	1.39	1.29	1.29		
	M	0.99	1.08	1.67	0.79	1.52	1.18	1.25	1.27	high
FS 23	P	0.93	1.31	1.93	1.16	0.88	1.16	1.28	1.24	
	M	0.85	1.25	2.01	1.16	0.99	0.86	1.19		high
FS 44	P	0.89	1.47	1.57	1.17	1.31	1.16	1.26		
	M	1.09	1.58	1.59	1.55	1.96	1.39	1.29	1.28	high

Table continued next page .....

Table 21 continued. . .. .

Entries	Cropping system	Lanet	Thika	Embu	Katumani	Kisii	Kakamega	Mean		
FS 176	P	1.02	1.65	1.92	1.15	1.22	1.10	1.39	1.42	high
	M	1.21	1.27	1.74	1.66	1.65	1.21	1.26		
FS 138	P	1.07	1.61	1.69	0.95	1.44	1.74	1.43	1.16	low
	M	0.79	1.21	1.36	1.06	1.78	0.95	1.19		
FS 442	P	0.68	1.26	1.80	1.35	2.16	1.16	1.40	1.36	high
	M	0.86	1.21	1.79	1.16	1.68	1.15	1.31		
FS 520	P	0.75	1.42	1.92	1.30	0.82	1.51	1.29	1.24	low
	M	0.88	1.15	1.21	1.06	1.58	1.34	1.20		
GLP	P	1.26	1.82	2.08	1.01	1.15	0.75	1.34	1.29	
	M	0.96	1.34	1.92	1.10	1.06	1.07	1.24		
Mean excluding the standard	P	0.98	1.46	1.81	1.05	1.32	1.34	2.62		
	M	1.02	1.29	1.58	1.19	1.54	1.18			

GLP 24 had a high oil content. GLP 2 and GLP 1004 had a low oil content.

Table 22 Data on % CRUDE PROTEIN obtained in the National Dry Beans Performance Trials at the various sites LONG rains 1980.

Entries	Cropping system	Lanet	Thika	Embu	Katumani	Kisii	Kakamega	Mean	
ST 33	P	20.25	19.52	23.49	18.00	20.69	19.94	20.31	20.68
	M	21.38	17.36	23.78	19.55	21.38	21.88	21.05	
ST 49	P	19.81	18.56	24.29	19.81	24.69	19.88	21.17	21.84
	M	21.81	18.89	28.29	19.63	20.63	25.83	22.51	
ST 92	P	19.00	18.81	23.05	22.56	23.19	17.75	20.56	20.65
	M	18.50	18.38	25.08	18.19	21.31	23.06	20.75	
ST 102	P	20.69	19.52	23.50	20.63	23.88	21.88	21.68	22.48
	M	23.94	19.33	25.67	23.44	23.13	24.19	23.28	
ST 352	P	18.88	18.91	21.58	20.56	21.38	18.19	19.92	20.62
	M	19.50	17.05	23.29	22.05	22.56	23.44	21.31	
FS 23	P	17.06	17.84	21.73	18.88	23.13	19.44	19.68	20.57
	M	17.13	19.41	24.72	20.23	23.25	24.00	21.46	
FS 44	P	18.88	17.26	24.42	20.06	22.82	19.75	20.53	20.54
	M	18.81	17.80	25.75	17.88	19.31	23.75	20.55	

Table continued next page..... .....

Table 22 continued. ...

Entries	Cropping system	Lanet	Thika	Embu	Katumani	Kisii	Kakamega	Mean	
FS 176	P	17.06	17.83	23.64	19.13	23.00	19.75	20.07	20.01
	M	17.56	18.80	24.15	16.88	19.50	22.75	19.94	
FS 438	P	17.75	17.86	22.83	22.56	20.06	18.44	19.92	20.14
	M	18.00	17.61	25.01	19.06	19.38	23.06	20.35	
FS 442	P	16.63	16.77	23.30	20.50	21.81	17.19	19.37	19.68
	M	18.21	18.67	23.92	20.00	17.88	22.25	19.99	
FS 520	P	16.81	17.49	22.19	19.63	20.63	18.21	19.16	19.25
	M	14.88	18.39	24.47	17.69	19.94	20.63	19.33	
GLP	P	17.19	18.72	23.38	23.56	24.56	21.50	21.48	
	M	20.19	19.14	26.67	20.94	23.56	22.56	22.18	
Mean excluding the standard	P	18.44	18.12	23.09	20.21	22.30	19.13		
	M	19.06	18.33	24.92	19.51	20.75	23.17		

GLP 24 had a Low Crude Protein content, GLP 2 and GLP 1004 had a high Crude Protein content.