ON-STATION SEED INCREASE AND ON-FARM MULTILOCATION COWPEA CULTIVAR TRIAL

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Based on research agreement between AFRIRECO/NESTEC headquartered in Abidjan, Côte d'Ivoire, and OAU/STRC on behalf of SAFGRAD, headquartered in Ouagadougou, Burkina Faso, seeds of thirteen elite cowpea cultivars were increased and an on-farm cowpea cultivar trial was conducted. The work was carried out by the cowpea program of INERA (The national agricultural research institute of Burkina Faso) at two sites, Loumbila and Kamboinse, for the seed increase and at three sites, three farmers each, at Pobe/Mengao in the Sahel, Ziniare in the Sudan savanna region and Diebougou in the northern Guinea savanna region..

The seed increase consisted of thirteen cultivars, namely: IAR-1696, IT82E-32, KVx295-2-124-51, IT84S-2246, IAR-48, IAR7/180-4-5-1, IT81D-994, IT85D-3516-2, CR06-07, IT81D-985, KVx164-65-5, KVx414-22-2 and KVx404-22-2 grown each in a block of 1200 m². Most of the cultivars matured between 62 and 71 days, except IAR-1696 (106 days), IT81D-994 (84 days), and IT81D-985 (80 days).

The AFRIRECO requirement of 80 kg of seed per cultivar was met for 11 out of 13 cultivars. The low seed production of cultivars IAR-48, IAR-1696 and IT84S-2246 was due either to limited seed supply at planting or dry spells during pod fill in October. A total of 975 kg of seed was dispatched to AFRIRECO/NESTEC, Abidjan, Côte d'Ivoire in December 1995. The profile of the cultivars was described based on background data.

On-farm cowpea cultivar trial consisted of 5 cultivars, namely: KVx61-1, KVx30-309-6G, KVx396-4-4, Gorom local and TVu2027 grown each in a block of 1000 m². It was conducted as above described in randomized complete block design with each farmers being a replication. The objective of the trial was to study the cost of cowpea production under farmers production conditions. Cowpea yields were higher at Pobe/Mengao in the Sahel than at Ziniare, and Diebougou in, respectively, the Sudan and northern Guinea savanna regions. This surprisingly low yield could be attributed to the no-application of the third insecticide spraying and the inexperience of farmers with on-farm trial at these two sites. Cultivar KVx61-1 was the top yielder. Cultivars KVx30-309-6G, Gorom local and KVx396-4-4 yielded equally to one another. Whereas cultivar TVu2027 did not produce any seed at all sites. The average cost of cowpea production was 222, 244 and 247 CFA F per kilogram at, respectively, Diebougou in the northern Guinea savanna, Ziniare in the Sudan savanna, and Pobe/Mengao in the Sahel. A total of 2,764 kg of cowpea seed produced in farmers field was dispatched to AFRIRECO/NESTEC Abidjan, Côte d'Ivoire in December 1995.

I. INTRODUCTION

Burkina Faso is the third producer of cowpea in Africa, after Nigeria and Niger. Its national production is estimated to 150,000 t/year. Cowpea is a major source of proteins for human population and livestock in lowland West and Central Africa. In rotation with cereals, it also contributes to soil fertility improvement as it enriches the soil with up to 30 kg of N/ha biologically fixed. Cowpea, as a major grain legume, is widely cultivated under rainfed conditions in Burkina Faso in the three major ecological zones namely, the Sahel, Sudan Savanna and the northern Guinea savanna, in association with cereals: sorghum, millet, and maize; and it is highly consumed.

Rainfall is monomodal, erratic and poorly distributed throughout the country. The Sahel is characterized by: an annual rainfall varying from under 300 to 600 mm; relatively low temperatures (10-15°C) from November to February, whilst April and May record average daily temperatures of 40°C and above. The length of the growing season varies from 2 to 3 months (late June to September), with the dry season lasting from October to mid-June.

The Sudan savanna has a rainfall of 600 to 900 mm; three distinct seasons: warm and dry from November to mid-February, hot and dry from mid-February to May, and hot and moist from June to October. The latter constitutes the growing season with an average of four months and 34-38°C.

The Northern Guinea savanna has a relatively more dependable rainfall of 900-1250 mm, spread over a 4 to 6 month period (from late May to late October) with mild temperatures as compared to the Sudan savanna. Because of this, it has a wide diversity of agricultural speculations, which include: maize as a predominant cereal; sorghum, cultivated largely in the transitional Sudano-

Guinean zone where the rainfall range is between 700-900 mm; and cotton as an industrial crop. Cowpeas and groundnuts are the only grain legumes usually intercropped within cereals.

Cowpea improvement programme was initiated in Burkina Faso in 1977 through collaborative research involving: the national cowpea programme of INERA (The National Agricultural Research Institute of Burkina Faso), the International Institute of Tropical Agriculture (IITA), and the Semi-Arid Food Grain Research and Development Project (SAFGRAD). New technologies have been developed. They include new cultivars, agronomic practices and storage methods and facilities. The traditional low yield of 200-300 kg/ha have been raised to a potentially high yield of 2500 to 3000 kg/ha with a complete control of insect pests. Improved cowpea agronomic practices were described in the INERA-SAFGRAD-AFRIRECO 1994 annual Report.

Based on research agreement between Afrireco/nestec headquartered in Abidjan, Cote d'Ivoire, and OAU/STRC on behalf of SAFGRAD, headquartered in Ouagadougou, Burkina Faso, seeds of thirteen elite cowpea cultivars were increased and an on-farm cowpea cultivar trial was conducted. The work was carried out by the cowpea program of INERA at two sites: Loumbila and Kamboinse (located at, respectively, 25 and 15 km from Ouagadougou) for the seed increase activities, and in three ecological zones (Pobe in the Sahel, Ziniare in the Sudan savanna and Diebougou in the northern Guinea savanna) for the on-farm trial.

These activities including seed produced and dispatched to Afrireco and the study of the cost of on-farm cowpea production are hereby reported as follows:

II. SEED PRODUCTION

Upon the request of **Afrireco**, thirteen cowpea cultivars were subjected to a seed increase in Burkina

Faso in 1995. The cultivars were to be yield tested in a replicated trial from which their agronomic characteristics would have been evaluated for their description. Since most of the cultivars have been extensively tested in Burkina Faso and in neighboring countries, through SAFGRAD and RENACO regional trials, we found it more appropriate to describe them based on background information synthesized across locations and/or years than a single year data. The agronomic characteristics requested by AFRIRECO in the agreement, are listed below. Their description in this report will, therefore, be based on the 1995 observation during seed increase as well as on background information.

Agronomic characteristics of cultivars and other data requested by Afrireco:

- Weather record (rainfall pattern)
- Sowing date
- Germination (%)
- Plant height at maturity
- Cycle (50% flowering)
- Cycle (50% maturity)
- Insect and diseases resistance level
- 1000 bean weight
- Yield of dry beans

2.1 Material and methods

The Kvx cultivars were bred in Burkina Faso; IAR and IT cultivars were bred in Nigeria; and the CR-

06-07 cultivar originated from Ghana. All cultivars are daylength neutral, except IAR1696 and, to some extent IT81D-895 AND IT81D-994, which are daylength sensitive.

Because the seed was drawn from the germplasm bank, cultivars IAR1696, IT84S-2246 and IAR48 were subjected twice to seed increase. Some difficulties were encountered with cultivar IAR48 for which only very limited seed was available in the germplasm bank, and cultivar IAR1696 for which moisture stress during the pod fill resulted in a significant yield loss.

To guarantee the genetic purity of each cultivar, the seed increase was carried out in large and separate blocks for each cultivar. The blocks were not randomized. The seed increase was implemented at Loumbila. The second seed increase of cultivars: IAR48, IT84S-2246 and IAR1696, was carried out at Kamboinse research station near Ouagadougou.

Each cultivar was grown in a block of 1200 m^2. The field plot was ploughed with a tractor to 25 cm deep, harrowed and ridged. It was fertilized with NPK fertilizer (14: 24: 14) at a rate of 100 kg/ha during land preparation. All cultivars were sown at a plant density of 62,000 plants/ha. The crops were weeded with hand hoes three times during the growth cycle. Insect pests were controlled by three sprays beginning 35 days after sowing for all cultivars except IAR1696, IT 81D-994 and IT 81D-985. For these latter cultivars, the first spraying started respectively 75, 52, and 50 days after sowing. The insecticide used consisted of a mixture of Deltamethrine at 12 g a.i./ha and Dimethoate at 400 g a.i./ha.

2.2 Results and discussion

The characteristics of the cultivars observed during seed increase in 1995 are given in Table 1. The germination was very good for all the cultivars (>90%) except IT84S-2446 (87%). Most of the cultivars matured between 62 and 71 days , except IAR1696 (106 days), IT81D-994 (84 days),

and IT81D-985 (80 days). The tallest cultivars are KVx295-2-124-51 (90 cm) and IT85D-3516-2 (80 cm). All cultivars exhibited good disease resistance. Cultivars IT85D-3516-2, KVx164-65-5, KVx414-22-2 and Kvx404-22-2 suffered less insect pest damages than other cultivars. Yield (estimated using yield square) were very high for all cultivars except IAR1696. This was due to a good rainfall distribution

up to the end of September. Cultivar IAR1696, with a critical photoperiod in early October, suffered of dry spells in October and was unable to flower and set and fill pods normally. As a result, its yield dropped drastically.

The quantity of seeds, per cultivar supplied to AFRIRECO is given on Table 2. The AFRIRECO requirement of 80 kg/cultivar was met for 11 cultivars out of 13. The low seed production for cultivars IAR48, IAR1696 and IT84S-2246 was due to the reasons given earlier in this report.

Table 1. Characteristics and yield of cultivars subjected to seed increase in 1995.

Cultivars	Sowing date	Germination %	Days to 50% flowering	Days to 50% Maturity	Plant height (cm)	Disease Resistance	Insect Resistance	1000 seed weight (g)	Seed yield* (Kg/ha)
IAR-1696	11-7-95	95	90	106	50	good	low	222	315
IT82E-32	11-7-95	97	43	62	70	good	low	126	3025
KVX295-2-124-51	11-7-95	92	45	67	90	moderate	low	189	2450
IT84S-2246	11-7-95	87	43	63	65	low	low	177	3062
IAR-48	14-7-95	95	42	64	60	good	low	177	2375
IAR7/180-4-5-1	14-7-95	96	44	65	70	good	low	176	2875
IT81D-994	14-7-95	97	69	84	50	good	low	207	1750
IT85D-3516-2	14-7-95	98	47	68	80	good	good	167	3367
CR06-07	14-7-95	96	46	65	70	good	low	129	2437
IT81D-985	14-7-95	98	62	80	50	good	low	222	2012
KVX164-65-5	14-7-95	95	47	69	60	moderate	good	177	3750
KVX414-22-2	14-7-95	97	48	71	50	good	good	182	2575
KVX404-22-2	14-7-95	98	46	66	50	good	good	133	3000

* Seed yield using yield squares

Table 2. The quantity of seeds supplied to AFRIRECO/NESTLE

Cultivars	Quantity (Kg)	Cultivars	Quantity (Kg)
IAR-1696	45	IT85D-3516-2	80
IT82E-32	83	CR06-07	81
KVX295-2-124-51	81	IT81D-985	63
IT84S-2246	76	KVX164-65-5	83
IAR-48	59	KVX414-22-2	81
IAR7/180-4-5-1	81	KVX404-22-2	81
IT81D-994	81		

2.3 Cultivars description

Agronomic characteristics of the 13 cultivars based on the multilocation testing in Burkina Faso and/or different countries in West and Central Africa are given in Tables 3.1 and 3.2. Whereas cultivars profiles are shown in Appendix 1.

Table 3.1. Agronomic characteristics of cowpea cultivars subjected to seed increase

Characteristics	Cultvars							
	IAR7/180	IAR1696	IAR48	CR-06-07	KVx295-2-124-51	KVx414-22-2	KVx164-65-5	KVx404-22-2
-Growth cycle: days to								
. Bud formation	42	-	42----	40	37	37	41	35
. Flowering	50	-	50	48	50	48	51	46
. Maturity	76	-	76	75	68	68	73	66
- Plant type$	Spr.	C	C	Spr.	Spr.	Spr.	Spr.	Spr.
- Plant height	60 cm	40 cm	60 cm	70 cm	75 cm	55 cm	60 cm	50 cm
- Leaf shape*	O	O	O	A	O	O	O	O
- Reaction todisease £:								
. Bacterial blight	MR	R	R	R	MR	MR	MR	MR
. Brown blotch	R	R	MR	R	MR	MR	MR	MR
. *Striga*	S	S	S	S	MR	-	R	S
. Web blight	R	MR	MR	MR	S	MR	S	MR
. Scab	MR	MR	MR	MR	MR	MR	S	MR
. *Septoria*	MR	MR	MR	MR	-	-	-	-
. Virus	MR	R	R	R	MR	MR	S	MR
- Reaction to insect pest £:								
. Flower thrips	T	S	S	S	S	T	T	T
. Aphids	S	S	S	S	R	S	T	S
. Pod sucking bugs	S	S	S	S	S	S	S	S
. *Maruca*	E	E	E	E	E	E	E	E
- Reaction to								
. Drought	T	S	S	S	T	R	R	R
. Heat stress	T	S	S	S	R	R	R	R
. Excess moisture	T	T	T	T	S	ST	S	S
- Seed characteristics								
. Color	white	white	white	dark-red	cream	white	brown	white
. Texture	rough	rough	roygh	smooth	rough	rough	rough	rough
. Size	medium	large	medium	small	medium	medium	medium	small
. 100 kernel weight (g)	17.6	22.2	17.7	12.9	18.9	18.2	17.7	13.3
- Seed yield kg/ha in:								
. Sahelo-sudanian zones (kg/ha)	-	-	-	-	700	800	700	800
. Moist savanna (kg/ha)	1000	1750	1525	1200	-	800	-	-
- Fodder yield kg/ha in:								
. Sahelo-sudanian zones (kg/ha)	1250	1250	1250	1250	1000	1000	1000	1000
. Moist savanna (kg/ha)	1750	1750	1750	1250	-	1500	-	-

S Spr., spreading; C., creeping. * O., oval; A., acuminate; m., medium; s., small; l., large. £ HR., high resistant, R.,resistant,mr., moderately; S., susceptible; HS., high susceptible. T., tolerant, ST.,some tolerance; E, escaping.

Table 3.2. Agronomic characteristics of cowpea cultivars subjected to seed increase.

Characteristics	Cultvars				
	IT81D-994	IT81D-985	IT82E-32	IT85D-3516-2	IT84S-2246
-Growth cycle: days to					
. Bud formation	62	62	38	42	38
. Flowering	74	74	44	51	44
. Maturity	89	89	66	70	66
- Plant type$	Spr;	Spr.	Spr.	Spr.	semi-erect
- Plant height	60 cm	60 cm	70cm	65 cm	70 cm
- Leaf shape*	O	O	A	O	O
- Reaction todisease £:					
. Bacterial blight	R	R	R	R	S
. Brown blotch	R	R	R	MR	R
. *Striga*	R	MR	S	S	HS
. Web blight	MR	MR	MR	MR	MR
. Scab	MR	MR	MR	MR	MR
. *Septoria*	-	-	-	-	-
. Virus	R	R	R	R	R
- Reaction to insect pest £:					
. Flower thrips	S	S	S	T	T
. Aphids	S	S	S	T	T
. Pod sucking bugs	S	S	S	T	T
. *Maruca*	E	E	E	E	E
- Reaction to					
. Drought	S	S	S	T	S
. Heat stress	S	S	S	T	S
. Excess moisture	T	T	T	T	T
- Seed characteristics					
. Color	white	white	red	mottled	brown
. Texture	rough	rough	smooth	smooth	smooth
. Size	large	large	small	medium	medium
. 100 kernel weight (g)	20.7	22.2	12.6	16.7	17.7
- Seed yield kg/ha in:					
. Sahelo-sudanian zones (kg/ha)	350	550	-	1000	-
. Moist savanna (kg/ha)	1200	1500	-	1000	-
. . Humid, sub-humid and coastal savanna zones:			826	-	1000
- Fodder yield kg/ha in:					
. Sahelo-sudanian zones (kg/ha)	1250	1250	-	1000	-
. Moist savanna (kg/ha)	1750	1750	-	1500	-
. . Humid, sub-humid and coastal savanna zones:			1500		1500

$ Spr., spreading; C., creeping. * O., oval; A., acuminate; m., medium; s., small; l., large.
£ HR., high resistant. R.,resistant.mr., moderately; S., susceptible; HS., high susceptible. T., tolerant. ST.,some tolerance; E, escaping.

III. ON-FARM TRIAL

3.1. The objectives of the trial were:

- To study in farmers field, the agronomic performance of five cowpea cultivars grown in three Different ecological zones;

- To compare the yield obtained by farmers with that obtained on station; and

- To study the cost of production of cowpea under the farmer's conditions.

3.2. Material and Methods

Five cultivars, namely, KVx 61-1, KVx 30-309-6G, KVx 396-4-4, Gorom local, and TVu2027 were used. The experimental design consisted of RCB with 5 cultivars replicated three times per site, each replication corresponded to a farmer.The trial was conducted at three sites, located each in a different ecological zone as follows:

. Pobe in the Sahel;

. Ziniare in the Sudan savanna; and

. Diebougou in the northern Guinea savanna.

Each cultivar was grown in a 1,000 m^2 plot.

Agronomic practices used consisted of:

- Land preparation: according to farmer's conditions and equipments;
- Fertilization: 100 kg NPK (14:24:14) per ha;
- Plant density: 62,000 plants/ha: 0.8 m between rows and 0.4 m between plants: 2 plants/hill;
- Weeding: 3 times (the third if needed) during the growth stage;
- Seeds were dressed with fungicide (Benlate); and
- Insecticide treatments consisted of spraying with Decis (Deltamethrine: 12 g a.i./ha) at flower bud formation, pod formation and during pod fill.

Data collected:

- Production cost factors (Fertilizer, insecticides, time spent during each working operation etc.) for the calculation of the cost of production of 1 kg of cowpea per farmers;
- Climatic data (Rainfall received during the growing season);
- Sowing date;
- Germination (%);
- Days to 50% flowering;
- Days to (50% maturity;
- Resistance/tolerance to insects and diseases;
- Resistance/tolerance to drought; and
- Yield kg/ha (seeds).

Seeds supplied to AFRIRECO:

Cowpea grain produced on farm trials were dried, cleaned, weighted, and treated with Phostoxin. They were bagged and delivered to NESTLE R&D Centre, Abidjan, Côte D'Ivoire.

3.3. Results and discussion

On-farm cowpea trial

Cultivar TVu2027 didn't produce any seed at all sites because of its daylength sensitivity and protracted dry, hot spells in late September and October (fig. 1,2 &3). Consequently, this cultivar was not considered in the statistical analysis.

Yields were low in 1995 particularly in the Sudan and northern Guinea savannas. This can be

attributed to poor rainfall distribution, a bad choice of plots by a farmer at Ziniare, lack of farmers' experience in dealing with on-farm testing as well as to a low priority given traditionally to cowpea production by farmers. For example: the third insecticide application was not carried out at Ziniaré and Diébougou. Cowpea is grown traditionally in mixed cropping systems and farmers give high priority to cereals, which are their staple crops. There was also an evidence of social factors at Diebougou where cowpea crop is harvested by a village community; and during the harvesting process each participants take some pods for his or her personal use. Nevertheless, a combined analysis of variance across sites showed cultivar KVx61-1 as the top yielder (Table 4). However, it did not significantly differ from cultivar KVx30-309-6G. The three other cultivars yielded equally to one another. The agronomic characteristics observed in 1995 are given in (Table 5). The incidence of insect pests was very low probably as a result of insect control with insecticides (Table.6). Only two cultivars KVx30-309-6G and Gorom Local suffered of disease damage (Table 7).

Table 4. Combined analysis over sites of characters of the on farm test conducted in three agro-ecological zones of Burkina Faso

Cultivars	% germination	50% flowering	50% maturity	yield kg/ ha
Kvx61-1	88.9B	46.1 A	66.8 A	840.9 A
Kvx30-309-6G	91.6A	45.0 B	65.7 B	790.7 AB
Kvx396-4-4	92.4A	45.1 A	65.7 B	684.1 B
Gorom local	90.6AB	46.7 A	67.4 A	709.8 B
Means	90.9	46.0	66.0	756.3
C.V. (%)	2.26	1.33	1.36	15.31
LSD (5%)	2.03	00.60	0.99	114.7

Table 5. Agronomic characteristics of the cultivars across years and locations in Burkina Faso

Cultivars	50% flowering	50%maturity	Yield kg/ha
KVX 61-1	47	70	1219
KVX30-309-6G	50	70	1000
KVX396-4-4	46	68	1200
GOROM LOCAL	48	70	1000

Table 6. Insect damage to the crops at POBE - ZINIARE -DIEBOUGOU .

Cultivars	Pobe	Ziniare	Diebougou
KVX61-1	low	low	low
KVX30-309-6G	low	low	low
KVX396-4-4	low	low	low
GOROM LOCAL	low	low	low

Table 7. Disease damage to cowpea crops at Pobe, Ziniare and Diebougou, Burkina Faso in 1995.

Cultivars	POBE	ZINIARE	DIEBOUGOU
KVX61-1	very low	very low	low
KVX30-309-6G	high	high	high
KVX396-4-4	very low	low	low
Gorom local	high	high	high

Seeds produced per site are given in Table 8. More seeds were produced at Pobe (1120 kg) than at the two other sites (Ziniare = 912 kg and Diebougou = 750 kg). Gorom local produced the least quantity of seeds (571 kg). Whereas the three other cultivars produced about the same quantity of seeds varying from 716 to 755 kg. Seed quality was better at Pobe than the three other sites (Table 9). Cultivars KVx61-1, KVx30-309-6G and Gorom local produced better quality seed than KVx396-

Table 10: Average cost of cowpea production per cultivar in the Sahel at Pobé, and at Ziniaré and Diébougou in, repectively the Sudan and Northern Guinea savanna regionsof Burkina Faso in 1995

	KVx 30-309-6G	KVx 396-4-4	KVx 61-1	Gorom Local	TVu 2027	Average[a]
			Pobe			
Cowpea yield (kg ha^{-1})	987	943	1040	900	-	968
Man power (Man-day ha^{-1})	253	253	253	253	173	253
Total cost of man power (CFA F ha^{-1})	148642	148642	148642	148642	68642	148642
Other operational costs (CFA F ha^{-1})	83040	83040	83040	83040	83040	83040
Cowpea production cost (CFA F ha^{-1})	231682	231682	231682	231682	151682	231682
Cost of production of 1 kg of cowpea	243	255	222	269	-	247
			Ziniare			
Cowpea yield (kg/ha)	787	567	783	620	-	689
Man power (Man-day ha^{-1})	150	150	150	150	130	150
Total cost of man power (CFA F ha^{-1})	73167	73167	73167	73167	54748	73167
Other operational costs (CFA F ha^{-1})	67940	67940	67940	67940	45293	67940
Cowpea production cost (CFA F ha^{-1})	141107	141107	141107	141107	122689	141107
Cost of production of 1 kg of cowpea	222	332	199	225	-	244
			Diebougou			
Cowpea yield (kg/ha)	707	527	677	590	-	625
Man power (Man-day ha^{-1})	120	120	120	120	90	120
Total cost of man power (CFA F ha^{-1})	60021	60021	60021	60021	31167	60021
Other operational costs (CFA F ha^{-1})	69340	69340	69340	69340	69340	69340
Cowpea production cost (CFA F ha^{-1})	129361	129361	129361	129361	100507	129361
Cost of production of 1 kg of cowpea	196	271	197	225	-	222

[a] Average of 4 cultivars, TVu 2027having been excluded.

4-4. This latter cultivar had a high proportion of spoiled seeds at Ziniare and Diebougou. Because of its earliness. It should have been harvested earlier than other cultivars.

Table 8. Quantity of seeds produced by site for AFRIRECO NESTLE in 1995

CULTIVARS	POBE	ZINIARE	DIEBOUGOU	TOTAL
KVX61-1	320 KG	232 KG	203 KG	755 KG
KVX30-309-6G	292 KG	266 KG	158 KG	716 KG
KVX396-4-4	279 KG	231 KG	212 KG	722 KG
Gorom Local	211 KG	183 KG	177 KG	571 KG
TOTAL	1102 KG	912 KG	750 KG	2764 KG

Table 9. Seed quality of the four cultivars at each site in

Cultivars	POBE	ZINIARE	DIEBOUGOU
KVX61-1	excellent	very good	very good
KVX30-309-6G	excellent	very good	good
KVX396-4-4	excellent	bad	very bad
Gorom local	excellent	very good	very good

Cost of cowpea production

The average cost of cowpea production per cultivar in the three different ecological zones in Burkina Fas is given in Table 10. The cost of production of 1 kg of cowpea varied on the average from 222 to 244 and 247 CFA F in, respectively the northern Guinea and Sudan savanna regions, and in the Sahel. It was cheaper to produce cultivar KVx61-1 as compared to other cultivars at all locations. KVx30-309-96 was the next cultivar cheaply produced at all locations.

Appendix-1

Profile of Cowpea Cultivars

Subjected to Seed Increase in Burkina Faso in 1995

1.Cultivar name: **IAR7/180-4-5-1**

- Origin: IAR Samaru/Zaria, Nigeria
- Ecological zones of adaptation: Guinea savannas for grain production; and Guinea and Sudan savannas and the Sahel for grain and fodder productions
- Countries where tested: Burkina Faso, Cameroon, Central African Republic, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Mali, Niger, Nigeria, Togo (RENACO regional trial report, 1992)
- Sowing date: Mid-July in semi-arid zones
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 35 to 49 days
- Days to flowering: 44 to 57 days
- Days to maturity: 63 to 89 days
- Plant type: Spreading
- Plant height: 0.60 m
- Leaf shape: Oval, medium to large size
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:
  . Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): moderatly resistant
  . Brown blotch *(Colletotricum capsici*): resistant
  . *Striga gesnerioides*: susceptible

. Moist savanna:
  . Web blight (*Rhizoctonia solani*): moderately resistant
  . Scab (*Elsinoe phaseoli*): moderately resistant
  . *Septoria* leaf spot (*S. vignae*): moderately resistant

. Viral disease:
  . Cowpea aphids born mosaic virus: moderately resistant

- **Reaction to major insect pests:**
  . Flower thrips *(Megalurothrips sjostedti*): tolerant
  . Aphids (*Aphis craccivora*): susceptible
  . Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): susceptible
  . *Maruca* pods borers (*M. testulalis*): escaping
- **Reaction to:**
  . Drought: tolerant
  . Heat stress: tolerant
  . Excess moisture: tolerant
- **Seed characteristics:**
  . Color: white
  . Texture: rough
  . Size: medium
  . 100 kernel weight: 17.6 g
- **Seed yields in** $:
  . The Sahelo-Sudanian zones:
  . Moist savanna: 1000 ±142 kg/ha; $\beta = 1.26$; $r^2 = 0.88$
- **Fodder yield in:**
  . The Sahelo-Sudanian zone: 1000 to 1500kg/ha
  . Moist savanna: 1500 to 2000 kg/ha

$ ß, coefficient of yield stability: $\beta = 1.0 \pm 0.2$ means stable yield; $\beta > 1.0$, low yield stability; $\beta < 1.0$ high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

2.Cultivar name: **IAR1696**

- Origin: IAR Samaru/Zaria, Nigeria
- Ecological zones of adaptation: Guinea savannas
- Countries where tested: Burkina Faso, Mali, Nigeria, (IITA-SAFGRAD annual reports, 1980-82)
- Sowing date: mid-July in semi-arid zones
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: photoperiod sensitive: initiates flower buds in late September
- Days to flowering: flowers in early October
- Days to maturity: matures in mid- to late October
- Plant type: creeping
- Plant height: 0.40 m
- Leaf shape: Oval, large size
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:
  . Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): resistant
  . Brown blotch (*Colletotricum capsici*): resistant
  . *Striga gesnerioides*: susceptible

. Moist savanna:
  . Web blight (*Rhizoctonia solani*): moderately resistant
  . Scab (*Elsinoe phaseoli*): moderately resistant
  . *Septoria* leaf spot (*S. vignae*): moderately resistant

. Viral disease:
  . Cowpea aphids born mosaic virus: resistant

- **Reaction to major insect pests:**
  . Flower thrips (*Megalurothrips sjostedti*): susceptible
  . Aphids (*Aphis craccivora*): susceptible
  . Pods sucking bugs (*Anoplocnemis*, *Acantomia*, etc;): susceptible
  . *Maruca* pods borers (*M. testulalis*): escaping
- **Reaction to:**
  . Drought: susceptible
  . Heat stress: susceptible
  . Excess moisture: tolerant
- **Seed characteristics:**
  . Color: white
  . Texture: rough
  . Size: large
  . 100 kernel weight: 22.2 g
- **Seed yields in** $:
  . The Sahelo-Sudanian zones:
  . Moist savanna: 1000 to 2500 kg/ha
- **Fodder yield in:**
  . The Sahelo-Sudanian zone: 1000 to 1500kg/ha
  . Moist savanna: 1500 to 2000 kg/ha

$ ß, coefficient of yield stability: ß =,1.0 ± 0.2 means stable yield; ß > 1.0, low yield stability; ß < 1.0 high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

3.Cultivar name: **IAR48**

- Origin: IAR Samaru/Zaria, Nigeria
- Ecological zones of adaptation: Guinea savannas
- Countries where tested: Burkina Faso, Ghana, Guinea, Mali, Niger, Nigeria, Senegal, Togo (IITA-SAFGRAD Annual report, 1983)
- Sowing date: mid-July in semi-arid zones
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 35 to 49 days
- Days to flowering: 44 to 57 days
- Days to maturity: 63 to 89 days
- Plant type: creeping
- Plant height: 0.60 m
- Leaf shape: oval, medium to large size
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:

. Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): resistant

. Brown blotch *(Colletotricum capsici*): moderately resistant

. *Striga gesnerioides*: susceptible

. Moist savanna:

. Web blight (*Rhizoctonia solani*): moderately resistant

. Scab (*Elsinoe phaseoli*): moderately resistant

. *Septoria* leaf spot (*S. vignae*): moderately resistant

. Viral disease:

. Cowpea aphids born mosaic virus: resistant

- **Reaction to major insect pests:**

. Flower thrips *(Megalurothrips sjostedti*): susceptible

. Aphids (*Aphis craccivora*): susceptible

. Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): susceptible

. *Maruca* pods borers (*M. testulalis*): escaping

- **Reaction to:**

. Drought: susceptible

. Heat stress: susceptible

. Excess moisture: tolerant

- **Seed characteristics:**

. Color: white

. Texture: rough

. Size: medium

. 100 kernel weight: 17.7 g

- **Seed yields in** $:

. The Sahelo-Sudanian zones:

. Moist savanna: 450 to 2600kg/ha

- **Fodder yield in:**

. The Sahelo-Sudanian zone: 1000 to 1500kg/ha

. Moist savanna: 1500 to 2000 kg/ha

$ ß, coefficient of yield stability: ß = 1.0 ± 0.2 means stable yield; ß > 1.0, low yield stability; ß < 1.0 high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

4.**Cultivar name:** CR-06-07

- Origin: CRI Kumasi, Ghana
- Ecological zones of adaptation: Humid, sub-humid, coastal and Guinea savannas
- Countries where tested: Burkina Faso, Cameroon, Central African Republic, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Mali, Niger, Nigeria, Togo (RENACO regional trial report, 1992)
- Sowing date: second season for humid,sub-humid and coastal savanna zones; and mid-July in semi-arid zones
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 31 to 50 days
- Days to flowering: 41 to 56 days
- Days to maturity: 65 to 85 days
- Plant type: Spreading
- Plant height: 0.70 m
- Leaf shape: narrow-oblong
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:

. Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): resistant

. Brown blotch *(Colletotricum capsici*): resistant

. *Striga gesnerioides*: susceptible

. Moist savanna:

. Web blight (*Rhizoctonia solani*): moderately resistant

. Scab (*Elsinoe phaseoli*): moderately resistant

. *Septoria* leaf spot (*S. vignae*): moderately resistant

. Viral disease:

. Cowpea aphids born mosaic virus: resistant

- **Reaction to major insect pests:**

. Flower thrips *(Megalurothrips sjostedti*): susceptible

. Aphids (*Aphis craccivora*): susceptible

. Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): susceptible

. *Maruca* pods borers (*M. testulalis*): escaping

- **Reaction to:**

. Drought: susceptible

. Heat stress: susceptible

. Excess moisture: tolerant

- **Seed characteristics:**

. Color: dark-red

. Texture: smooth

. Size: small

. 100 kernel weight: 12.9 g

- **Seed yields in** $:

. The Sahelo-Sudanian zones:

. Moist savanna: 1200 ±142 kg/ha; b = 0.90; $r^2 = 0.79$

- **Fodder yield in:**

. The Sahelo-Sudanian zone: 1000 to 1500kg/ha

. Moist savanna: 1000 to 1500 kg/ha

$ ß, coefficient of yield stability: ß = 1.0 ± 0.2 means stable yield; ß > 1.0, low yield stability; ß < 1.0 high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

5.Cultivar name: **KVx295-2-124-51**

- Origin: RENACO/SAFGRAD, Burkina Faso
- Ecological zones of adaptation: Sahelo-Sudanian zones
- Countries where tested: Burkina Faso, Cape Verde, Chad, Ghana, Mali, Mauritania, Nigeria, (RENACO regional trial report, 1992)
- Sowing date: mid-July in semi-arid zones
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 31 to 44 days
- Days to flowering: 42 to 58 days
- Days to maturity: 60 to 77 days
- Plant type: Spreading to semi-erect
- Plant height: 0.75 m
- Leaf shape: Oval, medium to large size, dark green
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:

. Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): moderatly resistant

. Brown blotch *(Colletotricum capsici*): moderately resistant

. *Striga gesnerioides*: moderately resistant

. Moist savanna:

. Web blight (*Rhizoctonia solani*): susceptible

. Scab (*Elsinoe phaseoli*): moderately resistant

. *Septoria* leaf spot (*S. vignae*): /

. Viral disease:

. Cowpea aphids born mosaic virus: moderately resistant

- **Reaction to major insect pests:**

. Flower thrips *(Megalurothrips sjostedti*): susceptible

. Aphids (*Aphis craccivora*): resistant

. Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): susceptible

. *Maruca* pods borers (*M. testulalis*): escaping

- **Reaction to:**

. Drought: tolerant

. Heat stress: tolerant

. Excess moisture: susceptible

- **Seed characteristics:**

. Color: cream

. Texture: rough

. Size: medium

. 100 kernel weight: 18.9 g

- **Seed yields in** $:

. The Sahelo-Sudanian zones: 700 ±239 kg/ha; $\beta = 1.09$; $r^2 = 0.88$

. Moist savanna:

- **Fodder yield in**:

. The Sahelo-Sudanian zone: 1000 kg/ha

. Moist savanna:

$ ß, coefficient of yield stability: ß = 1.0 ± 0.2 means stable yield; ß > 1.0, low yield stability; ß < 1.0 high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

Appendix 1.6.

6.**Cultivar name:** **KVx414-22-2**

- Origin: INERA, Burkina Faso
- Ecological zones of adaptation: Northern Guinea savanna and Sahelo-Sudanian zones
- Countries where tested: Burkina Faso (INERA Annual report, 1993)

- Sowing date: mid-July in semi-arid zones
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 33 to 42 days
- Days to flowering: 42 to 55 days
- Days to maturity: 62 to 75 days
- Plant type: Spreading
- Plant height: 0.55 m
- Leaf shape: oval, medium to large size
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:
  . Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): moderatly resistant
  . Brown blotch (*Colletotricum capsici*): moderately resistant
  . *Striga gesnerioides*:

. Moist savanna:
  . Web blight (*Rhizoctonia solani*): moderately susceptible
  . Scab (*Elsinoe phaseoli*): moderately resistant
  . *Septoria* leaf spot (*S. vignae*): /

. Viral disease:
  . Cowpea aphids born mosaic virus: moderately resistant

- **Reaction to major insect pests:**
  . Flower thrips (*Megalurothrips sjostedti*): tolerant
  . Aphids (*Aphis craccivora*): susceptible
  . Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): susceptible
  . *Maruca* pods borers (*M. testulalis*): escaping
- **Reaction to:**
  . Drought: resistant
  . Heat stress: resistant
  . Excess moisture: some tolerance
- **Seed characteristics:**
  . Color: white
  . Texture: rough
  . Size: medium
  . 100 kernel weight: 18.2 g
- **Seed yields in** $:
  . The Sahelo-Sudanian zones: 800 ±113kg/ha; $\beta = 1.21$; $r^2 = 0.86$
  . Moist savanna: 800 ±113 kg/ha; $\beta = 1.21$; $r^2 = 0.86$
- **Fodder yield in**:
  . The Sahelo-Sudanian zone: 1000 kg/ha
  . Moist savanna: 1500kg/ha

$ ß, coefficient of yield stability: $ß = 1.0 \pm 0.2$ means stable yield; $ß > 1.0$, low yield stability; $ß < 1.0$ high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

7.Cultivar name: **KVx164-65-5**

- Origin: RENACO/SAFGRAD, Burkina Faso
- Ecological zones of adaptation: Sahelo-Sudanian zones
- Countries where tested: Burkina Faso, Cameroon, Ghana, Mali, Niger, Nigeria, Togo (RENACO regional trial report, 1993)
- Sowing date: mid-July in semi-arid zones
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 32 to 50 days
- Days to flowering: 45 to 58 days
- Days to maturity: 60 to 87 days
- Plant type: Spreading
- Plant height: 0.60 m
- Leaf shape: oval, medium to large size
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:
  . Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): moderatly resistant
  . Brown blotch *(Colletotricum capsici*): moderately susceptible
  . *Striga gesnerioides*: resistant

. Moist savanna:
  . Web blight (*Rhizoctonia solani*): susceptible
  . Scab (*Elsinoe phaseoli*): susceptible
  . *Septoria* leaf spot (*S. vignae*): /

. Viral disease:
  . Cowpea aphids born mosaic virus: moderately rsusceptible

- **Reaction to major insect pests:**
  . Flower thrips *(Megalurothrips sjostedti*): tolerant
  . Aphids (*Aphis craccivora*): tolerant
  . Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): susceptible
  . *Maruca* pods borers (*M. testulalis*): escaping
- **Reaction to:**
  . Drought: resistant
  . Heat stress: resistant
  . Excess moisture: susceptible
- **Seed characteristics:**
  . Color: brown
  . Texture: rough
  . Size: medium
  . 100 kernel weight: 17.7 g
- **Seed yields in** $:
  . The Sahelo-Sudanian zones: 700 ±122 kg/ha; $\beta = 0.85$; $r^2 = 0.60$
  . Moist savanna:
- **Fodder yield in**:
  . The Sahelo-Sudanian zone: 1000 kg/ha
  . Moist savanna:

$ ß, coefficient of yield stability: ß = 1.0 ± 0.2 means stable yield; ß > 1.0, low yield stability; ß < 1.0 high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

Appendix 1.8.

8.Cultivar name: **KVx404-22-2**

- Origin: INEAR, Burkina Faso
- Ecological zones of adaptation: Northern Guinea savanna and Sahelo-Sudanian zones
- Countries where tested: Burkina Faso (INERA Annual Report, 1993)

- Sowing date: mid-July
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 35
- Days to flowering: 46
- Days to maturity: 66
- Plant type: spreading
- Plant height: 50 cm
- Leaf shape: oval, medium
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:
  . Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): moderately resistant
  . Brown blotch *(Colletotricum capsici)*: moderately resistant
  . *Striga gesnerioides*: susceptible

. Moist savanna:
  . Web blight (*Rhizoctonia solani*): susceptible
  . Scab (*Elsinoe phaseoli*): moderately resistant
  . *Septoria* leaf spot (*S. vignae*): -

. Viral disease:
  . Cowpea aphids born mosaic virus: moderately resistant

- **Reaction to major insect pests:**
  . Flower thrips *(Megalurothrips sjostedti)*: tolerant
  . Aphids (*Aphis craccivora*): susceptible
  . Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): susceptible
  . *Maruca* pods borers (*M. testulalis*): escaping
- **Reaction to:**
  . Drought: resistant
  . Heat stress: resistant
  . Excess moisture: some tolerance
- **Seed characteristics:**
  . Color: white
  . Texture: rough
  . Size: small
  . 100 kernel weight: 13.3 g
- **Seed yields in** $:
  . The Sahelo-Sudanian zones: 800 kg/ha
  . Moist savanna:
- **Fodder yield in**:
  . The Sahelo-Sudanian zone: 1000 kg/ha
  . Moist savanna:

$ ß, coefficient of yield stability: ß = 1.0 ± 0.2 means stable yield; ß > 1.0, low yield stability; ß < 1.0 high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

9.Cultivar name: **IT81D-994**

- Origin: IITA Ibadan, Nigeria
- Ecological zones of adaptation: Guinea savanna zones for grain production; Sahelo-Sudanian zones for fodder production
- Countries where tested: Benin, Burkina Faso, Cameroon, Ghana, Mali, Niger, Nigeria, Togo (RENACO regional trial report, 1993; IITA-SAFGRAD, 1987)
- Sowing date: mid-July in semi-arid zones
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 47 to 77 days
- Days to flowering: 61 to 87 days
- Days to maturity: 79 to 100 days
- Plant type: Spreading
- Plant height: 0.60 m
- Leaf shape: oval, medium to large size, dark green
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:
  . Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): resistant
  . Brown blotch *(Colletotricum capsici)*: resistant
  . *Striga gesnerioides*: resistant

. Moist savanna:
  . Web blight (*Rhizoctonia solani*): moderately resistant
  . Scab (*Elsinoe phaseoli*): moderately resistant
  . *Septoria* leaf spot (*S. vignae*): /

. Viral disease:
  . Cowpea aphids born mosaic virus: resistant

- **Reaction to major insect pests:**
  . Flower thrips *(Megalurothrips sjostedti)*: susceptible
  . Aphids (*Aphis craccivora*): susceptible
  . Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): susceptible
  . *Maruca* pods borers (*M. testulalis*): escaping
- **Reaction to:**
  . Drought: susceptible
  . Heat stress: susceptible
  . Excess moisture: tolerant
- **Seed characteristics:**
  . Color: white
  . Texture: rough
  . Size: large
  . 100 kernel weight: 20.7 g
- **Seed yields in** $:
  . The Sahelo-Sudanian zones: 350 ±122 kg/ha; $\beta = 0.29$; $r^2 = 0.08$
  . Moist savanna: 400 to 2000kg/ha
- **Fodder yield in**:
  . The Sahelo-Sudanian zone: 1000 to 1500 kg/ha
  . Moist savanna: 1500 to 2000 kg/ha

$ ß, coefficient of yield stability: $ß = 1.0 \pm 0.2$ means stable yield; $ß > 1.0$, low yield stability; $ß < 1.0$ high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

10.Cultivar name: IT81D-985

- Origin: IITA Ibadan, Nigeria
- Ecological zones of adaptation: Guinea savanna zones for grain production; Sahelo-Sudanian zones for fodder production
- Countries where tested: Benin, Burkina Faso, Cameroon, The Gambia, Mali, Niger, Nigeria, Togo (IITA-SAFGRAD, Annual report 1985)
- Sowing date: mid-July in semi-arid zones
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 47 to 77 days
- Days to flowering: 61 to 87 days
- Days to maturity: 79 to 100 days
- Plant type: Spreading
- Plant height: 0.60 m
- Leaf shape: oval, medium to large size, dark green
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:
  . Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): resistant
  . Brown blotch (*Colletotricum capsici*): resistant
  . *Striga gesnerioides*: some resistance

. Moist savanna:
  . Web blight (*Rhizoctonia solani*): moderately resistant
  . Scab (*Elsinoe phaseoli*): moderately resistant
  . *Septoria* leaf spot (*S. vignae*): /

. Viral disease:
  . Cowpea aphids born mosaic virus: resistant

- **Reaction to major insect pests:**
  . Flower thrips (*Megalurothrips sjostedti*): susceptible
  . Aphids (*Aphis craccivora*): susceptible
  . Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): susceptible
  . *Maruca* pods borers (*M. testulalis*): escaping
- **Reaction to:**
  . Drought: susceptible
  . Heat stress: susceptible
  . Excess moisture: tolerant
- **Seed characteristics:**
  . Color: white
  . Texture: rough
  . Size: large
  . 100 kernel weight: 22.2 g
- **Seed yields in $:**
  . The Sahelo-Sudanian zones: 250 to 900 kg/ha
  . Moist savanna: 1000 to 2000kg/ha
- **Fodder yield in:**
  . The Sahelo-Sudanian zone: 1000 to 1500 kg/ha
  . Moist savanna: 1500 to 2000 kg/ha

$ ß, coefficient of yield stability: ß = 1.0 ± 0.2 means stable yield; ß > 1.0, low yield stability; ß < 1.0 high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

11.Cultivar name: **IT82E-32**

- Origin: IITA Ibadan, Nigeria
- Ecological zones of adaptation: Humid, sub-humid and coastal savanna zones.
- Countries where tested: All West and Central African countries (RENACO regional trial reports, 1987-88, 1990, 1992 and 1993; IITA-SAFGRAD, 1987)
- Sowing date: second growing season in late August or early September
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 36 to 40 days
- Days to flowering: 43 to 46 days
- Days to maturity: 60 to 73 days
- Plant type: spreading
- Plant height: 0.70 m
- Leaf shape: narrow-oblong
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:

. Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): resistant

. Brown blotch *(Colletotricum capsici*): resistant

. *Striga gesnerioides*: susceptible

. Moist savanna:

. Web blight (*Rhizoctonia solani*): moderately resistant

. Scab (*Elsinoe phaseoli*): moderately resistant

. *Septoria* leaf spot (*S. vignae*): /

. Viral disease:

. Cowpea aphids born mosaic virus: resistant

- **Reaction to major insect pests:**

. Flower thrips *(Megalurothrips sjostedti*): susceptible

. Aphids (*Aphis craccivora*): susceptible

. Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): susceptible

. *Maruca* pods borers (*M. testulalis*): escaping

- **Reaction to:**

. Drought: susceptible

. Heat stress: susceptible

. Excess moisture: tolerant

- **Seed characteristics:**

. Color: red

. Texture: smooth

. Size: small

. 100 kernel weight: 12.6 g

- **Seed yields in** $:

. The Sahelo-Sudanian zones:

. Moist savanna:

. Humid, sub-humid and coastal savanna zones: 826 ±127 kg/ha, $\beta = 1.36$; $r^2 = 0.96$

- **Fodder yield in**:

. The Sahelo-Sudanian zone:

. Moist savanna:

. Humid, sub-humid and coastal savanna zones: 1500kg/ha

$ ß, coefficient of yield stability: ß = 1.0 ± 0.2 means stable yield; ß > 1.0, low yield stability; ß < 1.0 high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

12.Cultivar name: IT85D-3516-2

- Origin: IITA Ibadan, Nigeria
- Ecological zones of adaptation: Guinea and Sudan savannas and the Sahel.
- Countries where tested: Burkina Faso, Cameroon, Chad, Niger, and Nigeria (RENACO regional trial reports, 1990)
- Sowing date: mid-July
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 31 to 54 days
- Days to flowering: 44 to 58 days
- Days to maturity: 61 to 80 days
- Plant type: Spreading
- Plant height: 0.65 m
- Leaf shape: oval, medium size
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:
  . Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): resistant
  . Brown blotch *(Colletotricum capsici*): moderately resistant
  . *Striga gesnerioides*: susceptible

. Moist savanna:
  . Web blight (*Rhizoctonia solani*): moderately resistant
  . Scab (*Elsinoe phaseoli*): moderately resistant
  . *Septoria* leaf spot (*S. vignae*): /

. Viral disease:
  . Cowpea aphids born mosaic virus: resistant

- **Reaction to major insect pests:**
  . Flower thrips *(Megalurothrips sjostedti*): tolerant
  . Aphids (*Aphis craccivora*): tolerant
  . Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): tolerant
  . *Maruca* pods borers (*M. testulalis*): escaping
- **Reaction to:**
  . Drought: tolerant
  . Heat stress: tolerant
  . Excess moisture: tolerant
- **Seed characteristics:**
  . Color: mottled
  . Texture: smooth
  . Size: medium
  . 100 kernel weight: 16.7 g
- **Seed yields in** $:
  . The Sahelo-Sudanian zones: 500 to 1500 kg/ha
  . Moist savanna: 500 to 1500 kg/ha
- **Fodder yield in**:
  . The Sahelo-Sudanian zone: 1000 kg/ha
  . Moist savanna: 1500 kg/ha

$ ß, coefficient of yield stability: ß = 1.0 ± 0.2 means stable yield; ß > 1.0, low yield stability; ß < 1.0 high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

13.Cultivar name: IT84S-2246

- Origin: IITA Ibadan, Nigeria
- Ecological zones of adaptation: Humid, sub-humid and coastal savanna zones.
- Countries where tested: Benin, Burkina Faso, Cameroon, Chad, Cape Verde, The Gambia, Ghana, Guinea, Mali, Niger, Nigeria, and Togo. (RENACO regional trial reports, 1987-88, 1990, 1992 and 1993; IITA-SAFGRAD, 1987)
- Sowing date: second growing season in late August or early September
- Days to germination: 3 days when sown after a rainfall > 15 mm;
- Days to flower buds formation: 36 to 40 days
- Days to flowering: 43 to 46 days
- Days to maturity: 60 to 73 days
- Plant type: semi-erect
- Plant height: 0.70 m
- Leaf shape: oval, medium size, dark green
- **Reaction to major diseases of:**

. Sahelo-Sudanian zones:
  . Bacterial blight (*Xanthomonas campestis* pv. *vignicola*): susceptible
  . Brown blotch *(Colletotricum capsici)*: resistant
  . *Striga gesnerioides*: highly susceptible

. Moist savanna:
  . Web blight (*Rhizoctonia solani*): moderately resistant
  . Scab (*Elsinoe phaseoli*): moderately resistant
  . *Septoria* leaf spot (*S. vignae*): /

. Viral disease:
  . Cowpea aphids born mosaic virus: resistant

- **Reaction to major insect pests:**
  . Flower thrips *(Megalurothrips sjostedti)*: tolerant
  . Aphids (*Aphis craccivora*): tolerant
  . Pods sucking bugs (*Anoplocnemis, Acantomia*, etc;): tolerant
  . *Maruca* pods borers (*M. testulalis*): escaping
- **Reaction to:**
  . Drought: susceptible
  . Heat stress: susceptible
  . Excess moisture: tolerant
- **Seed characteristics:**
  . Color: brown
  . Texture: smooth
  . Size: medium
  . 100 kernel weight: 17.7 g
- **Seed yields in** $:
  . The Sahelo-Sudanian zones:
  . Moist savanna:
  . Humid, sub-humid and coastal savanna zones: 500 to 1500 kg/ha
- **Fodder yield in**:
  . The Sahelo-Sudanian zone:
  . Moist savanna:
  . Humid, sub-humid and coastal savanna zones: 1500kg/ha

$ ß, coefficient of yield stability: ß = 1.0 ± 0.2 means stable yield; ß > 1.0, low yield stability; ß < 1.0 high yield stability. r^2 = coefficient of determination associated with the regression mean yield on conditions indices, it measures the percentage of sum of squares accounted for by the regression line.

Appendix-2

ETUDE SUR LE COUT

DE PRODUCTION DU NIEBE AU BURKINA FASO

Introduction

C'est dans le cadre des accords de recherche entre AFRIRECO/NESTEC à Abidjan, Côte d'Ivoire, et l'OUA/CSTR à travers le SAFGRAD à Ougadougou, Burkina Faso, que cette étude a été menée par l'INERA. L'étude comprend 5 cultivars de niébé et a pour objectif d'établir le coût de production du niébé dans les différentes zones écologiques du Burkina Faso. Ceci en vue de déterminer les zone les plus économiques de production du niébé et où d'importants investicements peuvent être effectués dans un tout prochain avenir pour la promotion de cette culture.

Dans un premier temps on examinera les materiels et les methodes utilisés pour l'établissement du coût de production; et dans un deuxième temps on passera en revue les résultats de l'étude que l'on discutera ensuite.

I. MATERIELS ET METHODES

I. 1 PRESENTATION DES SITES ET VILLAGES

Il convient de préciser en premier lieu que plusieurs critères sont utilisés par l'INERA pour le choix des villages de recherche selon le programme de recherche sur les systemes de production (RSP). On peut entre autres distinguer des critères primaires qui sont : les conditions agroclimatiques et pédologiques, la population, les caractéristiques des systèmes de cultures et d'élevage; d'autres critères secondaires tels que l'accessibilité au village en saison pluvieuse, le dynamisme des groupements; la motivation des producteurs viennent complèter la liste. On distingue ainsi pour notre étude:

1. La Zone Sahélienne

Située au Nord du 14e parallèle dans la partie Nord du Burkina Faso, la zone sahélienne comprend les régions de Dori d'Arbinda, Gorom Gorom, Markoye et Djibo, dans cette zone un village, Pobé, Mengao a été retenu pour le test. Ce village est de nos jours utilisé par l'INERA comme sîte de recherche, il reçoit moins de 600 mm d'eau par an et une saison de pluie de moins de 90 jours.

2.La Zone de Savane Soudanienne

Avec une pluviosité annuelle comprise entre 600 et 900 mm, cette zone se situe entre le 13e et le 14e parallèle, trois villages (Pousghin, Laongo et Loumbila) à raison d'un paysan par village ont été retenus.

3.La Zone de Savane Nord Guinéenne

Cette zone fortement arrosée du Burkina Faso au potentiel agronomique énorme reçoit entre 900 et 1250 mm d'eau par an, dans ce sîte également trois paysans ont été retenus dans la province de la Bougouriba à Diébougou.

I. 2 DONNEES COLLECTEES

Une fiche technique a été établie pour noter les temps de travaux pour les opérations culturales suivantes :

. la préparation du champ
. le labour à traction animal
. l'épandage engrais
. les semis
. les resemis
. le démariage
. le sarclage
. le transport de l'eau pour la pulvérisation
. le traitement
. le desherbage
. la récolte
. le transport de la récolte
. le battage
. le vannage.

I. 3 CALCUL DU COÛT DE PRODUCTION

Les temps des travaux ont été évalués en franc CFA par site: dans la zone sahélienne, la journée agricole est évaluée 600 f.cfa pour les hommes(h) et les femmes(f) et 500 pour les enfants(e) ;550 en zone soudanienne et 500 en zone de savane nord guinéenne pour les hommes et les femmes.

Les charges autres que la main d'oeuvre sont évaluées comme ci-après à l'hectare:

. la traction animale à 14540 FCFA par hectare,
. les produits phytosanitaires: 1l/ha soit 12500 F CFA par hectare
. l'engrais (NPK) soit 16000 f.cfa par hectare
. la location du pulvérisateur a été estimée à 10000 F CFA par hectare et pour toute la campagne.
. le transport d'eau a varié en fonction des localités : 5000 F CFA à Pobe, 2400F CFA F CFA à Ziniaré, et 3800 F CFA à Diébougou par hectare pour toute la campagne.

Les temps de travaux collectés par paysan (annexes) représentaient les temps mis dans tout l'essai. Cependant les opérations culturales de la récolte à la mise en sac ne concernent pas la variété TVU 2027 pusqu'elle n'a pas produit de gousse à cause de son cycle très long. Cette variété n'a donc pas été récoltée.

Dans le calcul des coûts de production on distingue donc deux sous totaux:

. Sous-total 1 : de la préparation du sol avant la récolte. Ce sous-total concerne 5 variétés.

. Sous-total 2 : de la récolte à la mise en sac. Ce sous-total concerne 4 variétés.

Le coût de la main d'oeuvre en zone Sahélienne est obtenu selon la formule suivante :

m.o. (h+f) = ((total1fem + total1hom)/5 + (total2fem + total2hom)/4)/8 * 600 F CFA
+ m.o. (e) = (total1enfant/5 + total2enfant/4)8 * 550 F CFA = 2250 F CFA

Les autres charges sont obtenues comme indiqué plus haut.

Le coût total de la production, étant la somme du montant total de la main d'eouvre et des autres charges. Le procédé de calcul est le même sur les autres sites et encore plus facile car à Ziniaré les enfants n'ont pas intervenus dans les opérations culturales, et seuls les hommes ont travaillé sur les champs à Diébougou.

II RESULTATS ET DISCUSION

Les données de base pour la main d'oeuvre et les charges rélatives aux différentes opérations culturales sont présentées en Annexes I à III. Aussi, les détails de coût de production du niébé dans les différents sites sont présentés en Annexes IV à VI.

Le Tableau 1 présente le coût moyen de la production du niébé par variété et par site. L'observation des données ci-dessus permet de faire les interprétations et les analyses suivantes:

- Dans la production du Kvx 30-309-6G :

Le rendement moyen le plus élevé est réalisé dans la zone sahélienne (987 kg/ha) suivi de la zone soudanienne (805 kg/ha) et de la zone nord guinéenne (707 kg/ha) tandis que le coût de production le plus élevé est relevé à Ziniaré, le 2e à Dédougou et le 3e à Pobé.

- En ce qui concerne le Kvx-396-4-4 :

Dans le sîte de Pobé on enregistre le rendement le plus élevé suivi de Ziniaré et de Dédougou. Le coût de production est également plus important à Ziniaré puis dans l'ordre Diédougou et Pobé.

- Pour ce qui est de Kvx 61-1 :

C'est encore dans la zone sahélienne qu'on enregistre le rendement le plus élevé suivi de la zone soudanienne et de la zone nord guinéenne. Ziniaré puis Dédougou et Pobé réalisent le coût de production le plus élevé.

- Enfin, pour le Gorom Local :

Pobé réalise encore le rendement le plus élevé suivi de Ziniaré et de Diédougou. Par contre Ziniaré détient pour cette variété le coût de production le plus élevé devant Diédougou et Pobé dans l'ordre. Ce qui est indéniable dans l'observation de ces données c'est que le sîte de Pobé Mengao dans la zone sahélienne réalise les rendements les plus élevés dans la production des quatre variétés de Niébé suivi du sîte de la zone soudanienne et de la zone nord guineenne.Par contre les coûts de production sont moyens à Pobé suivi de Diébougou et de Ziniaré. Par conséquent si un choix était à faire pour la production du Niébé, en tenant compte du coût de production, la zone nord guinéenne semble meilleure à la zone soudanienne, les

deux zones étant précédées par le sîte de Pobé.

Cependant plusieurs disparités interviennent à l'intérieur de chaque sîte de recherche: des disparités existent par rapport aux moyennes générales dans la production des variétés, des disparités spécifiques existent également au sein des paysans qui ont fait l'objet de l'étude.

1. Par rapport aux sites :

La zone sahélienne bien que détentrice des rendements les plus élevés, en moyenne ne détient pas par variété, les coûts totaux de production les plus bas. (Tableau 1, Figures 1&2). Plusieurs facteurs expliquent ce phénomène :

1) L'utilisation de la main d'oeuvre qui s'avère très importante au sahel. Dans cette zone hommes, femmes et enfants ont participé à toutes les opérations culturales qui sont évaluées à 600 F par journée agricole pour les adultes et 500 F pour les enfants, en tenant compte de ces efants dont les temps de travaux sont difficilement appreciables dans la réalité, le coût de la main d'oeuvre se trouve élevé.

2) Les facteurs climatiques tels que les températures de l'air et du sol, respectivement au dessus de 38°C peuvent adversement affectées les rendements du niébé (Muleba, 1986). En effet, selon les techniciens de l'INERA installés sur les sîtes, de longues périodes de sécheresse enregistrées à Pobé et Diébougou ont influencées la production du niébé dans ces régions alors que les rendements y étaient estimés autour de 1,1 à 1,2 t/ha en 1992 selon les agents du Centre Régional de la Promotion Agro-Pastoral (CRPA) du sud-ouest.

3) L'utilisation de la traction animale dans la zone nord guinéenne n'est pas aussi importante, selon Gnideni Yaro (1990), la possession et l'utilisation du matériel d'attelage par les exploitations apparaissent aujourd'hui comme les meilleurs indicateurs pour une bonne appréciation des niveaux de technicité des agriculteurs.

4) Il était recommandé aux techniciens trois pulvérisations aux insecticides par variété, cela n'a pas été le cas pour les sites de Diébougou et Ziniaré. Ceci peut être à l'origine de la faible productivité enregistrée dans ces deux sites.

5) Au Sahel, le niébé n'occupe pas une place prépondérante dans le système de culture, il est surtout produit en association avec le mil, contrairement à Diébougou, où il est même organisé chaque année une fête de niébé.

2 par rapport aux paysans :

En considérant la région de Diébougou, certaines pratiques sociales peuvent affecter la qualité des données, par exemple, pendant les récoltes une partie de la production est emportée par les paysans, parfois clandestinement.

Les paysans tests de l'INERA, pour cette étude dans les sites n'ont pas le même niveau technique, il y en a qui s'y mettent, d'autres par contre du fait de l'ignorance même des objectifs des essais n'ont pas bien mené le travail.

L'étude de plusieurs dates de semis met en évidence la possibilité de trouver une date appropriée pour minimiser les effets adverses des températures sur le niébé (Daviré). Lorsqu'on observe les données de Ziniaré et de Diébougou l'on constate que des disparités existent par rapport aux dates, en effet, à Diébougou le 1e paysan a semé le 17 juillet tandis

Tableau 1 : Moyenne des Coûts de production totaux à l'ha par cultivar par site

	KVx 30-309-6G	KVx 396-4-4	KVx 61-1	Gorom Local	TVu 2027	Moyenne[a]
			Pobe			
Rendement (kg/ha)	987	943	1040	900	-	968
M.0 total a l'ha (Nbre jour)	253	253	253	253	173	253
Cout total M.O a l'ha (CFA)	148642	148642	148642	148642	68642	148642
Autres Charges a l'ha (CFA)	83040	83040	83040	83040	83040	83040
Coût de production a l'ha (CFA)	231682	231682	231682	231682	151682	231682
Coût de production d'un kg de niebe	243	255	222	269	-	247
			Ziniare			
Rendement (kg/ha)	787	567	783	620	-	689
M.0 total a l'ha (Nbre jour)	150	150	150	150	130	150
Cout total M.O a l'ha (CFA)	73167	73167	73167	73167	54748	73167
Autres Charges a l'ha (CFA)	67940	67940	67940	67940	45293	67940
Coût de production a l'ha (CFA)	141107	141107	141107	141107	122689	141107
Coût de production d'un kg de niebe	222	332	199	225	-	244
			Diebougou			
Rendement (kg/ha)	707	527	677	590	-	625
M.0 total a l'ha (Nbre jour)	120	120	120	120	90	120
Cout total M.O a l'ha (CFA)	60021	60021	60021	60021	31167	60021
Autres Charges a l'ha (CFA)	69340	69340	69340	69340	69340	69340
Coût de production a l'ha (CFA)	129361	129361	129361	129361	100507	129361
Coût de production d'un kg de niebe	196	271	197	225	-	222

[a]Moyenne de 4 varietes, la Tvu 2027 étant exclue.

Fig. 1. Moyenne de cout de production d'un kilogramme de niebe par site en 1995.

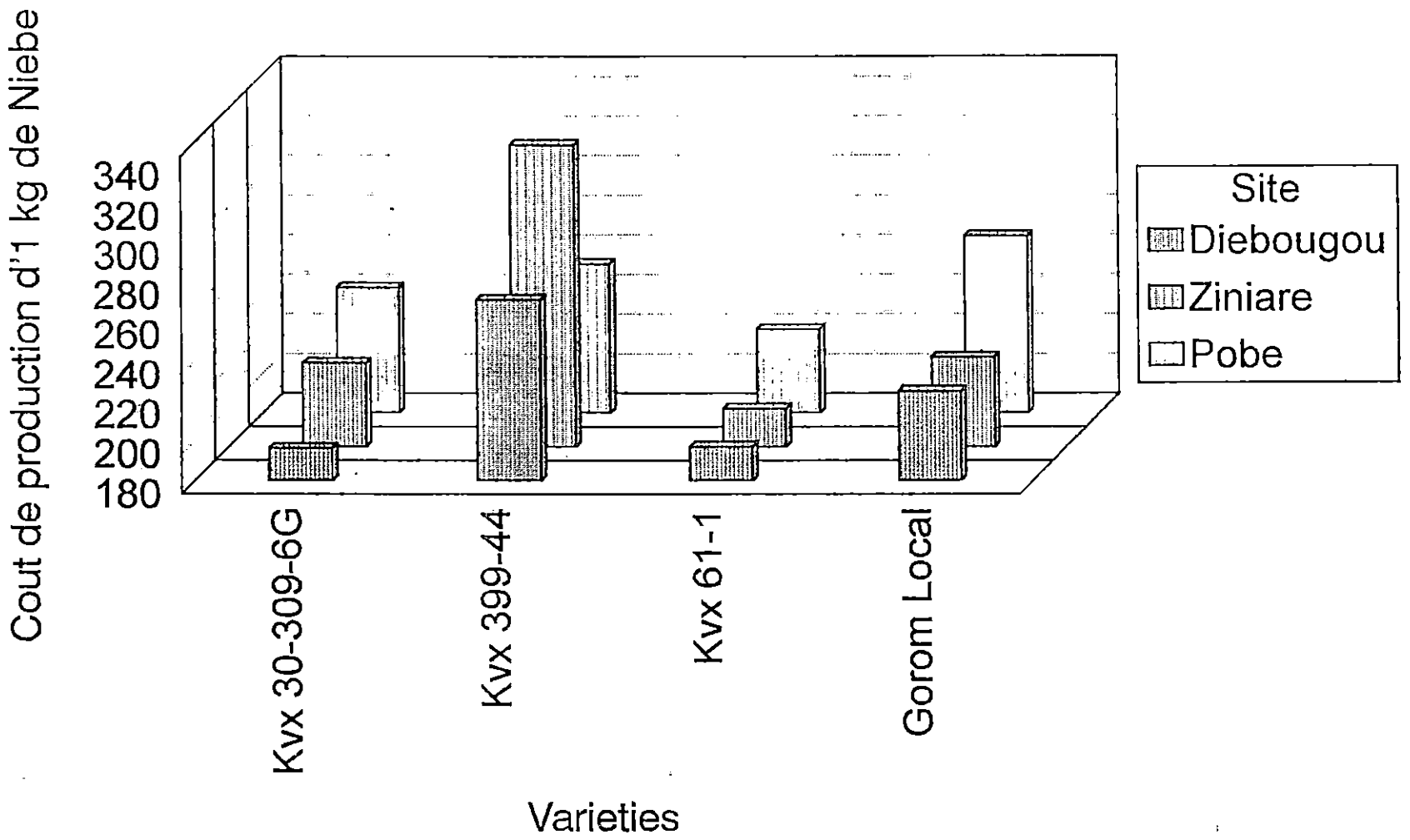
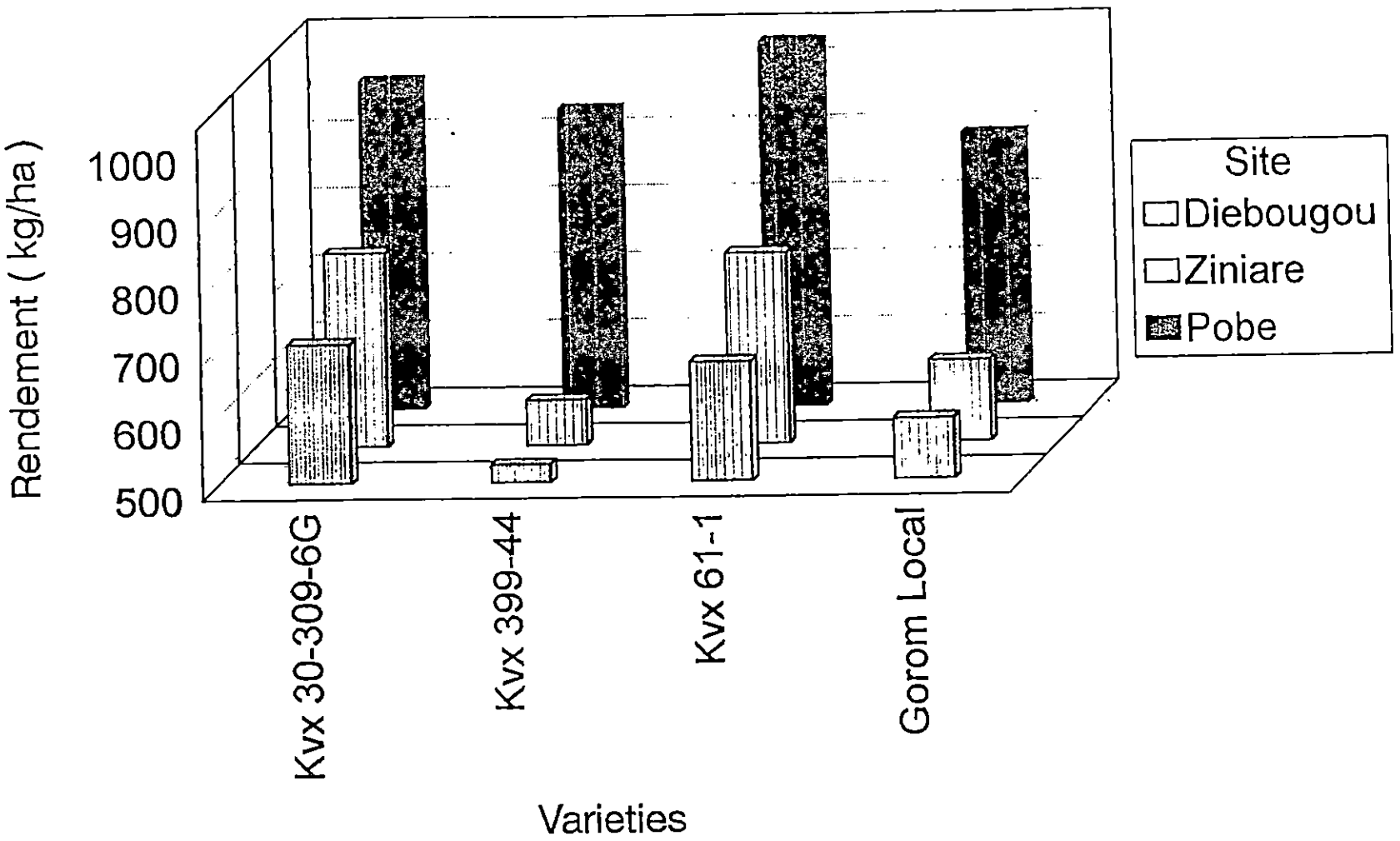


Fig. 2. Moyenne de rendement de varietes de niebe par site en 1995.



que le deuxième attend jusqu'au 28 juillet, soit une différence de 11 jours pour le semis ce qui confirme le fait que certaines ne coïncident pas avec les dates appropriées.

En somme l'on constate que le niébé, de façon générale, est une légumineuse prometteuse, cependant son avenir reste hypotequé par des contraintes levables qui limitent sa production. On peut entre autre citer une organisation meilleure des paysans dans les opérations culturales.

Annexe I.1: total main d'oeuvre paysan 1 a Pobe

operations culturales	Hommes (heures)	Femmes (heures)	Enfants (heures)
preparation du sol	3		3
labour	16		8
epandage engrais	3		
semis	39	33	26
demariage	-		
1er sarclage	60		45
1er traitement	5		5
2e sarclage	43	30	6
2e traitement	5		5
desherbage	57	22	11
3e traitement	7		7
total1	238	158	128
recolte	84	30	42
transport recolte	8		
battage	45		20
vannage	-		
total 2	136	90	62

Charge :

NPK=1600 F CFA
Décis=1250*3=3750 F CFA
transport eau=500 FCFA
attelage=1454 F CFA
pulverisateur=1000 F FCA
total=8304 F CFA

Annexe I.2: total main d'oeuvre paysan 2 a Pobe

operation culturales	hommes	femmes	enfants
preparation	12		18
labour	22		6
epandange engrais	1	1	1
semis	30	20	20
demariage			
1e sarclage	65	52	39
1er traitement			
2e sarclage	47	31	47
2e traitement			
3e sarclage	40	28	45
3e traitement			
total 1	217	132	219
recolte	168	72	72
transport recolte	1		
battage	120		60
vannage		194	25
total 2	289	166	155

Charge :

NPK=1600
Décis =1250.3=3750
transport eau=500
attelage=1454
pulverisateur=1000
total=8304

Annexe I.3: total main d'oeuvre paysan 3 a Pobe

operation culturales	hommes	femmes	enfants
preparation sol	2		
labour	29		20
epandage engrais	4		4
semis	56	14	14
1er sarclage	30	15	20
1er traitement	5		
2e sarclage	24	12	24
2e traitement	5		
3e sarclage	40	24	16
3e traitement	6		
total	200	65	134
recolte	64	48	48
battage	90		72
vannage		60	
transport recolte	1		
total 2	155	108	120

Charge :

NPK=1600
Décis =1250.3=3750
transport eau=500
attelage=1454
pulverisateur=1000
total=8304

Annexe II.1 total main d'oeuvre paysan 1 a Ziniare

operation culturales	hommes	femmes
preparation-labour	28	46
epandage engrais	3.5	5.5
semis	30	50
1er sarclage	51	83
2e sarclage	21.5	81.5
1er traitement	11	
2e traitement	10	
total1	475.5	
recolte	46	
battage vannage	12.5	50
total 2	108.5	

Charge :

NPK=1600
Décis =1250*2=2500
transport eau=240
attelage=1454
pulverisateur=1000
total=6794

Annexe II.2 total main d'oeuvre paysan 2 a Ziniare

operation culturale	hommes	femmes
preparation sol	80	
labour	70	
epandage engrais	30	
semis	20	
1er sarclage	80	32
2e sarclage	70	28
1er traitement	20	
2e traitement	16	
total1	446	
recolte	75	
transport recolte	5	2
battage-vannage	35	14
total 2	156	

Charge :

NPK=1600
Décis =1250*2=2500
transport eau=240
attelage=1454
pulverisateur=1000
total=6794

Annexe II.3 total main d'oeuvre paysan 3 a Ziniare

operation culturale	hommes :	femmes
labour	-	-
rayonnage-semis	54	81
resemis	9	54
1er sarclage	54	54
1er traitement	6.5	
2e traitement	15	
total1	427	
recolte	32	
transport	2	
battage-vannage	18	
total2	52	

Charge :

NPK=1600
Décis =1250*2=2500
transport eau=240
attelage=1454
pulverisateur=1000
total=6794

Annexe III.1 total main d'oeuvre paysan 1 a Diebougou

operation culturale	hommes
preparation-labour	56
epandage engrais	20
semis	28
1er sarclage	56
2e sarclage	64
1er traitement	10
2e traitement	10
total1	244
recolte	112
battage-vannage	88
total 2	200

Charge :

NPK=1600
Décis =1250*2=2500
transport eau=380
attelage=1454
pulverisateur=1000
total=6934

Annexe III.2 total main d'oeuvre paysan 2 a Diebougou

operation culturale	hommes
preparation-labour	70
epandage engrais	35
semis	35
1er sarclage	60
2e sarclage	60
1er traitemebt	14
2e traitement	14
recolte	105
total 1	393
battage	105
total 2	105

Charge :

NPK=1600
Décis =1250*2=2500
transport eau=380
attelage=1454
pulverisateur=1000
total=6924

Annexe III.3 total main d'oeuvre paysan 3 a Diebougou

operation culturale	hommes
preparation-labour	48
epandage engrais	24
semis	24
1er sarclage	60
2e sarclage	42
1er traitement	10
2e traitement	8
total1	216
recolte	72
battage	72
total 2	144

Charge :

NPK=1600
Décis =1250*2=2500
transport eau=380
attelage=1454
pulverisateur=1000
total=6934

Annexe IV : Coût de production total à l'ha par cultivar dans le sîte de Pobe

	KVx 30-309-6G	KVx 396-4-4	KVx 61-1	Gorom Local	TVu 2027
		Paysan 1			
Rendement (kg/ha)	710	600	910	570	-
M.0 total a l'ha (Nbre jour)	190	190	190	190	150
Cout total M.O a l'ha (CFA)	103950	103950	103950	103950	62950
Autres Charges a l'ha (CFA)	83040	83040	83040	83040	83040
Coût de production a l'ha (CFA)	186990	186990	18699	186990	145990
Coût de production d'un kg de niebe (CFA)	263	312	205	328	-
		Paysan 2			
Rendement (kg/ha)	1390	1220	1300	1050	-
M.0 total a l'ha (Nbre jour)	350	350	350	350	230
Cout total M.O a l'ha (CFA)	213575	213575	213575	213575	84825
Autres Charges a l'ha (CFA)	83040	83040	83040	83040	83040
Coût de production a l'ha (CFA)	296615	296615	296615	296615	167865
Coût de production d'un kg de niebe (CFA)	220	243	228	282	
		Paysan 3			
Rendement (kg/ha)	860	1010	910	1080	-
M.0 total a l'ha (Nbre jour)	220	220	220	220	140
Cout total M.O a l'ha (CFA)	128400	128400	128400	128400	58150
Autres Charges a l'ha (CFA)	83040	83040	83040	83040	83040
Coût de production a l'ha (CFA)	211440	211440	211440	211440	141190
Coût de production d'un kg de niebe (CFA)	246	209	232	196	

Annex V : Coût de production total à l'ha par cultivar dans le site de Ziniare

	KVx 30-309-6G	KVx 396-4-4	KVx 61-1	Gorom Local	TVu 2027
			Paysan 1		
Rendement (kg/ha)	1000	1000	1210	770	-
M.0 total a l'ha (Nbre jour)	150	150	150	15 0	130
Cout total M.O a l'ha (CFA)	76535.9	76535.9	73535.9	76535.9	57887.5
Autres Charges a l'ha (CFA)	67940	67940	67940	6794 0	67940
Coût de production a l'ha (CFA)	144475.9	144475.9	144475.9	144475.9	125827.5
Coût de production d'un kg de niebe (CFA)	144	144	119	188	-
			Paysan 2		
Rendement (kg/ha)	570	480	690	590	-
M.0 total a l'ha (Nbre jour)	150	15 0	15 0	150	130
Cout total M.O a l'ha (CFA)	88996.9	88996.9	88996.9	88996.9	61325
Autres Charges a l'ha (CFA)	67940	67940	67940	67940	67940
Coût de production a l'ha (CFA)	156936.9	156936.9	156936.9	156936.9	129265
Coût de production d'un kg de niebe (CFA)	251	298	207	242	-
			Paysan 3		
Rendement (kg/ha)	790	220	450	500	-
M.0 total a l'ha (Nbre jour)	160	160	160	160	120
Cout total M.O a l'ha (CFA)	53968.8	53968.8	53968.8	53968.8	45031.3
Autres Charges a l'ha (CFA)	67940	67940	67940	67940	67940
Coût de production a l'ha (CFA)	121908.8	121908.8	121908.8	121908.8	112973
Coût de production d'un kg de niebe (CFA)	271	554	271	244	-

Annexe VI : Coût de production total à l'ha par cultivar dans le site de Diebougou

	KVx 30-309-6G	KVx 396-4-4	KVx 61-1	Gorom Local	TVu 2027
		Paysan 1			
Rendement (kg/ha)	950	710	880	750	-
M.0 total a l'ha (Nbre jour)	11	11	11	11	9
Cout total M.O a l'ha (CFA)	61750	61750	61750	61750	30500
Autres Charges a l'ha (CFA)	69340	69340	69340	69340	69340
Coût de production a l'ha (CFA)	131090	131090	131090	131090	99840
Coût de production d'un kg de niebe (CFA)	268	397	234	243	-
		Paysan 2			
Rendement (kg/ha)	490	330	560	540	-
M.0 total a l'ha (Nbre jour)	13.5	13.5	13.5	13.5	10
Cout total M.O a l'ha (CFA)	68812.5	68812.5	68812.5	68812.5	36000
Autres Charges a l'ha (CFA)	69340	69340	69340	69340	69340
Coût de production a l'ha (CFA)	138152.5	138152.5	138152.5	138152.5	105340
Coût de production d'un kg de niebe (CFA)	145	195	157	184	-
		Paysan 3			
Rendement (kg/ha)	680	540	590	480	-
M.0 total a l'ha (Nbre jour)	10	10	10	10	7
Cout total M.O a l'ha (CFA)	49500	49500	49500	49500	27000
Autres Charges a l'ha (CFA)	69340	69340	69340	69340	69340
Coût de production a l'ha (CFA)	118840	118840	118840	118840	96340
Coût de production d'un kg de niebe (CFA)	175	220	201	248	-

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