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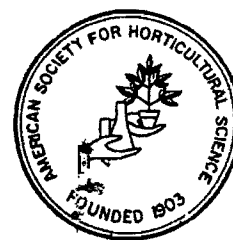
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# COWPEA RESEARCH AT THE CARICOM FARMS PROJECT IN BELIZE

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## ABSTRACT

Cowpea, *Vigna unguiculata* (L.) Walp. var. California No. 5, was recommended as the second crop in an upland rice/ grain legume combination to be grown at the Caricom Farms project site in Belize. High rainfall, susceptibility to seedling and pod rot diseases and uneven maturity made this variety unsuitable for inclusion in the cropping programme. A screening programme was developed over the last two years (1983–85) using varietal accessions from the Caribbean, Latin America and Africa. Trials were conducted on the Vertisols of the Spanish Lookout series which are calcareous in nature. Varieties were assessed for seed colour, seed size, growth, habit, yield and cooking quality. Results so far have indicated that varieties Vita 3 (red-seeded) and Laura B (black-eyed type) have consistently yielded over 1,600 and 1,100 kg ha<sup>-1</sup> (14 per cent M.C.) respectively. Other varieties have yielded in excess of 1,500 kg ha<sup>-1</sup> but have been evaluated only during one cropping season.

## RESUMEN

El caupí, *Vigna unguiculata* (L.) Walp. var. California No. 5, fue recomendado como el segundo cultivo entre una combinación de arroz de zona alta y leguminosa de grano, la cuál se la plantaría en el proyecto de Fincas del Caricom en Belize. Alta incidencia de lluvias, susceptibilidad a la pudrición de plántulas y vainas y una maduración irregular, hicieron que esta variedad no fuese adecuada para ser inculida en el programa de cultivación anteriormente mencionado. En los dos últimos años (1983-85), un programa de selección fue desarrollado, utilizando líneas experimentales del Caribe, Latino America y Africa. Se llevaron a cabo ensayos del Vertisol de la serie Spanish Lookout, los cuales son de naturaleza calcarea. Las variedades fueron evaluadas de acuerdo a color y tamaño de la semilla, crecimiento, hábitos y rendimiento y condiciones optimas de cocción. Hasta el momento los resultados han indicado que las variedades, Vita 3 (de semilla roja) y Laura B (de semilla moteada negra), consistentemente rindieron mas de 1600 y 1100 kg/ha (14% M.C.) respectivamente. Otras variedades rindieron más de 1500 kg/ha, pero estas fueron evaluadas solamente durante una siembra.

Keywords: *Vigna unguiculata*, Variety testing, Belize.

Cowpea *Vigna unguiculata* (L.) Walp. is an important food legume in many Caribbean countries. Its use in Belize, however, is not widespread (McGann, 1984). Production of the crop is limited, and the only confirmed production of commercial significance was 10ha produced by one farmer in 1982–83 with a reported yield of 1,000 kg ha<sup>-1</sup>.

### Cowpea production at Caricom Farms Ltd.

Caricom Farms Ltd. (CFL) was established in 1982 as a joint project between the governments of Belize and Jamaica and the Caribbean Food Corporation. The project is financed during its pilot stage (5 years) by the European Development Fund of the EEC. One of the objectives of the project was to produce upland rice and cowpea for export to the Commonwealth Caribbean Community (Caricom). These products are now either being imported into the region or are in deficit production. Belize could therefore benefit from such market conditions if it could produce cowpea successfully. Table 1 shows the importation of black-eye pea into Barbados and Trinidad and Tobago for the years 1981–83. Data in the Table

indicate a potential market of 1,100 tonnes that could be satisfied by production of cowpea in Belize. Demand is expected to increase. Thomas (1980) estimated that total food legume demand in the Caricom region would increase from 77,000 tonnes in 1978 to 89,000 tonnes in 1988 (Table 2). Cowpea would form part of this increased demand.

The first attempt at commercial cowpea production was not very successful and a yield of only 500 kg ha<sup>-1</sup> was achieved. Variety California No. 5 was grown. Climatic conditions at the project site during the time of year when cowpea can be grown in the rice rotation were those of high rainfall and high relative humidity.

The period between mid-December and mid-March in theory would be the ideal time for planting. Rainfall recorded for this period in the 1983–84 cropping season was 325mm. During the first two weeks of this period (mid to end December) 102mm of rainfall was recorded. Planting during this time exposed germinating seedlings to waterlogged conditions hence causing seedling rot. The dry season begins normally in March and therefore late planting runs the risk of water stress at the podding/maturity stage.

Table 1: Important of black-eye peas into Barbados and Trinidad & Tobago, 1981-83.

Year	Description	Unit	Barbados	Trinidad & Tobago	Total
1981	Quantity	Kg	172,270	802,665	974,935
	Value	EC\$	499,531	2,255,076	2,754,607
1982	Quantity	Kg	210,893	770,031	980,924
	Value	EC\$	527,454	1,950,616	2,478,070
1983	Quantity	Kg	227,343	879,670	1,107,013
	Value	EC\$	512,436	1,823,470	2,335,900

Source: Agri-Systems (Jamaica) Ltd. (1984) - Evaluation of Caricom Farms Belize for the Caribbean Food Corporation.

Table 2: Total legume demand and production in the Commonwealth Caribbean.

Country	Total prodn. (Tonnes)	Total required <sup>1</sup> (Tonnes)	Deficit in prodn. (Tonnes)	Projected requirement in 10 years <sup>2</sup> (Tonnes)
Trinidad & Tobago	1,130	19,854	18,724	21,577
Grenada	36	1,791	1,755	2,169
Barbados	248	4,534	4,286	4,737
St. Vincent	175	1,698	1,523	1,756
St. Lucia	58	2,146	1,088	2,598
Dominica	N.A.	1,362	N.A.	1,394
Antigua	39	1,381	1,342	1,592
St. Kitts	139	1,213	1,074	1,230
Monsterrat	20	243	223	246
Jamaica	5,170	36,872	31,702	42,931
Bahamas	N.A.	3,601	N.A.	5,242
Belize	1,800	2,463	663	3,255

1. Based on recommendatooon of 18.66kg/capita/yr.

2. Based on 1978 population growth rate.

N.A. = not available

Source: Thomas (1980)

The soil types at the project site are Vertisols of the Spanish Lookout and Young Gal series. These have moderately deep top soils of 30–90cm depth. They are dark grey to black with very poor internal drainage (Birchall and Jenkins, 1978) and are predominantly clay with a marl subsoil and with mottling occurring increasingly below 20cm. Soil pH ranges between 6.5 and 7.5. Soil P and Mg levels are low; N is moderate and K fairly high.

The soils become saturated very rapidly and dry out just as quickly. In dry periods they crack and this if it is very severe can cause root damage to the crop.

At maturity variety California No. 5 becomes highly susceptible to pod rot if climatic conditions are similar to those described above; the result being poor quality discoloured grains. California No. 5 was therefore not considered a suitable variety for commercial production under the prevailing conditions and this led to the temporary suspension of cowpea production. It was decided that efforts should be concentrated therefore on selection of a variety or varieties which are adaptable to local growing conditions.

#### The role of the research programme

The research programme began in 1983 with its objective being to find a cowpea variety or varieties which could be grown at the project site on a commercial basis.

Certain selection criteria were established. These in prioritised order were:

- High yielding varieties whose production can be mechanised i.e. erect, pods at the top of the canopy or above it.
- Tolerance to local conditions i.e. high rainfall and heavy soils.
- Short duration.

Black-eye (i.e. cream seeded with black-eye) and red-seeded varieties would be given preference for market considerations but other seed colours would nevertheless be investigated.

Four trials were conducted over two cropping seasons; 1983/84 and 1984/85.

#### Materials and methods

Field trials were conducted using seed material received from external sources along with California No. 5 which was obtained from the Agriculture Department in Belize. Experimental design for all trials except Trial 2 was the complete randomised block. All trials with this design were replicated three times except Trial 3 which had four replications. Trial 2 was unreplicated and was used mainly for seed multiplication and observation.

Trials were planted either under conventional tillage or minimum tillage conditions (Trials 3 and 4) Fertilizer was applied by hand prior to planting, into furrows 10cm deep.

Trials 1 and 2 were given 100 kg ha<sup>-1</sup> each of Triple Super-phosphate (TSP), Diammonium Phosphate (DAP) and K-mag. Trials 3 and 4 were supplied with 100 kg ha<sup>-1</sup> each of DAP and Magnesium Oxide (MgO) and 70 kg ha<sup>-1</sup> of Sulphate of Potash. All trials had 10 kg ha<sup>-1</sup> of a micro-nutrient mixture containing Ferrous Sulphate, Zinc Sulphate, Copper Sulphate, Manganese Sulphate and Solubor in the ratio of 15:10:6:5:5. Rhizobium inoculant was applied to all seeds before planting.

Plot size used was 10m x 3m for Trials 1 and 3 while Trial 4 had a plot size of 5m x 2m. Trial 2 was planted from 1 to 3 rows of 5m length depending on seed availability. Planting distance was 10cm within rows spaced at 35cm.

Herbicide application for trials under conventional tillage was alachlor (Lasso) given pre-emergence at 6.6 litres ha<sup>-1</sup> in 400 litres of water. For minimum tillage plots in addition to alachlor, paraquat and glyphosate (Round-up) at 2.5 and 1.5 litres ha<sup>-1</sup> respectively were applied pre-emergence in 400 litres of water. Volunteer rice was hand weeded from plots with conventional tillage as needed. All plots were treated once with monocrotophos (Nuvacron) at 330g a.i. ha<sup>-1</sup> for control of leaf eating beetles at the seedling stage.

Plots were harvested by hand. Trials 1 and 2 were threshed manually while Trials 3 and 4 were threshed using the Votex Rice fan thresher modified for threshing grain legumes.

Trial 1 was planted twice on December 15, 1983 and January 5, 1984. Varieties evaluated were Vita-3, Local Jamaica (Yvon Clay), ER-7, Laura-B and California No. 5.

Trial 2 was planted January 12, 1984 with varieties Queba Cadeira, CNC-0434, CNC-27E, EMAPA-822 (Vita-3), Vita-2, EPACE-6, EPACE-1, Laura-B, TUMA-1180, Yvon Clay, EMAPA-821, Manaus, California No. 5, ER-7 and UCRI.

Trial 3 was planted January 5, 1985 with nine varieties selected from Trial 2.

Trial 4 was planted twice on January 15 and January 18, 1985 with varieties IT82<sup>E</sup>-18, IT82<sup>D</sup>-789, IT82<sup>D</sup>-889, Vita-3, Laura-B and California No. 5.

Observations were recorded on days to flowering, days to harvest, 100 grain weight, yield and rainfall during the cropping period. Data are presented in Tables 3 to 9.

A cooking evaluation was carried out on Vita-3, Laura-B and California No. 5 after the 1983-84 trials (Trial 1). Other varieties were not evaluated as their grain size was below the minimum acceptable one of 14g per 100 grains, a decision made subsequent to the planting of Trial 1.

One half cup of each variety was pressure cooked in a Prestige pressure cooker at 1.07 kg cm<sup>-2</sup>. Grains were cooked for 10, 15, 20, 25 or 30 minutes at full pressure. Twenty grains were selected from each variety and the degree of cooking assessed. Cooked status was determined by squeezing the grain between thumb and fore-finger. Four categories of cooking were recognised:

- i) Very soft – grains began to crush on being held
- ii) Soft – grains crushed easily with light pressure
- iii) Fairly hard – grains resisted crushing but were crushed with extra pressure
- iv) Hard – grains did not crush even with extra pressure

Grains within categories very soft and soft were considered adequately cooked. Results are presented in Table 10.

## Results and discussion

### *Trial 1 - planted on 15 December 1983 and 5 January 1984*

Data presented in Table 3 indicate that varieties Vita-3 and Local Jamaica yielded significantly more than other varieties at both times of planting. California No. 5 performed very poorly during the first planting but yielded as good as Laura-B and ER-7 for the second planting. During the December planting, California No. 5 was seriously affected by *Cercospora* sp. and *Fusarium* sp. It was considered that this was related to the high rainfall during the crop cycle as well as the susceptibility of California No. 5 to the diseases.

Rainfall data recorded at CFL during the period of experimentation are presented in Table 4. The December planted crop had 326mm of rainfall compared to 210mm recorded for the crop planted in January. The seedling stage is a critical period of crop development; excess moisture during this period exposes seedlings to diseases, reduces crop vigour and causes death of seedlings. The December planted crop had 102.8mm of rain during this period compared to 31mm for the January planted crop. California No. 5 was observed to be most adversely affected by the higher rainfall conditions. There was also higher rainfall from the flowering to maturity stages for the December crop.

### *Trial 2 – planted on 12 January, 1984*

This trial was not replicated and was used mainly for seed multiplication. Varieties were selected from this set for testing in future experiments. Criteria used were 100-grain weight (a minimum of 14g) and plant type as regards mechanisation i.e. semi-erect to erect plant types were preferred. Varieties selected from this trial and used in Trial 3 were CNC-27E, EMAPA-822 (Vita-3), Vita-2, CNC-0434, EPACE-1, EPACE-

Table 3: Data on cowpea varieties planted at Caricom Farms 1983-1984.<sup>1</sup>

Characteristic Assessed	Planted on 15 December, 1983					Planted on 5 January, 1984				
	Vita-3	Local Jamaica	ER-7	Laura B	Cal 5 <sup>3</sup>	Local Jamaica	Vita-3	ER-7	Laura B	Cal 5 <sup>3</sup>
Days to 50% flowering	57	61	56	54	54	N.A.	N.A.	57	54	54
Days to harvest	89	89	80	80	80	85	86	88	81	85
Av. plant ht. (cm)	38	36	29	25	29	34	31	30	21	25
Lodging (Yes/No)	Yes <sup>2</sup>	Yes <sup>2</sup>	No	No	No	Yes <sup>2</sup>	Yes <sup>2</sup>	No	No	No
No. pods/plant	6	13	13	10	8	12	6	13	13	15
No. seeds/pod	17	11	8	7	4	10	11	9	7	6
100 grain wt (g)	20	10	9	17	20	10	17	9	14	19
Yield g/plot	5,278	4,876	3,530	3,425	1,228	5,124	5,055	3,564	3,494	2,929
Yield (kg/ha)	1,759a	1,622a	1,177b	1,142b	409c	1,708a	1,685a	1,188b	1,165b	976b

1. Figures are the average of 3 replications.

2. Lodging estimated at less than 20%.

3. California No. 5

Yields with the same letters were not significantly different at P = 0.05 (DMRT)  
LSD (kg/ha) were 307 and 465 respectively for December and January planted trials.

Table 4: Rainfall during crop development for cowpea planted in December 1983 and January 1984 at Caricom Farms.

Days after planting	Stage of crop development	Rainfall (mm)	
		15 Dec. 1983 planted	5 January 1984 planted
1 - 14	Seedling	101.8	31.0
15 - 28	Vegetative	40.5	57.1
29 - 42	Vegetative	75.5	77.2
43 - 56	Vegetative	54.7	11.3
57 - 70	Flowering/Podding	40.9	20.4
71 - 84	Maturity	12.1	12.8
Total		325.5	209.8
Av. no days to harvest		84	85

6, Laura-B, and TUMA-1180. Quebra Cadeira had the highest yield per plant and the highest 100-grain weight (27g) but was not selected for further testing as it was a prostrate type and therefore not suitable for mechanisation. It might be a useful variety for cultivation by small farmers. Data from this trial are given in Table 5.

*Trial 3 – planted on 5 January 1985*

The results of this trial are presented in Table 6. Variety CNC-27E yielded 2,144 kg ha<sup>-1</sup> which was

significantly better than all other varieties except CNC-0434 and California No. 5. California No. 5 performed well in this trial compared to Trial 1 in 1983–84 but it only yielded significantly higher than EPACE-6. It was noted that time taken to complete the crop cycle was extended to 90 or more days and this may have been a result of the lack of moisture during the early crop life.

Table 5: data on 15 cowpea varieties planted at Caricom Farms Ltd. on 12 January, 1984.

Variety	Days to harvest	Plant height (cm)	No. plants harvested	No. pods/plant	No. Seeds/pod	Seeds color	100 - grain wt. (g)	Yield/ plant (g)
Quebra Cadeira	81	17	11	27	6	White	28	44
CNC - 27E	81	35	41	14	10	Brown	15	16
EMAPA - 822	75	33	81	81	9	Red	16	14
Vita - 2	83	27	80	10	10	Red	17	14
CNC - 0434	84	42	131	11	11	Cream	14	12
EPACE - 6	79	42	93	11	9	Brown	19	12
Laura - B	75	17	77	12	5	Cream	16	10
TUMA - 1180	83	34	105	2	11	Red	18	10
Yvon Clay	79	26	102	13	9	Brown	10	10
EMAPA - 831	76	25	93	12	9	Brown	11	11
EPACE - 1	76	25	138	13	8	Brown	13	9
MANAUS	76	28	106	17	9	Brown	9	8
California No. 5	78	25	81	12	6	Cream	20	8
ER - 7	83	27	87	17	8	Cream	10	7
UCR - 1	79	10	76	6	4	Red	8	2

Table 6: Data<sup>1</sup> on nine cowpea varieties planted January 5, 1985 at Caricom Farms Ltd.

Variety	Days to 50% flowering	Days to harvest	Plant height (cm)	No. pods/plant	No. Seeds/pod	Seeds color	100 grain wt. (g)	Yield	
								(g/plot)	(kg/ha)
CNC - 27E	58	92	61	13	13	Brown	15.9	6,431	2,144 a
CNC -0434	57	94	58	16	12	Cream	16.0	5,554	1,852 ab
California - 5	52	89	53	13	9	Cream	20.5	5,533	1,845 abc
Vita - 3	57	95	55	8	14	Cream	20.2	5,168	1,723 bcd
TUMA - 1180	53	93	53	11	13	Red	18.8	5,168	1,723 bcd
Laura - B	58	89	56	13	11	Cream	13.6	5,132	1,711 bcd
Vita - 2	58	91	52	10	13	Red	19.9	5,131	1,711 bcd
EPACE - 1	57	96	53	10	11	Brown	19.0	4,532	1,647 bcd
EPACE - 6	57	97	53	7	11	Brown	15.2	4,532	1,352 d

<sup>1</sup> Values are the average of four replications.

Yields followed by the same letters were not significantly different at P - 0.05 (DMRT) LSD (kg/ha) = 368.59

**Trial 4 – planted on 15 and 18 January 1985**

Data from this trial (Table 7) indicated that variety Vita-3 yielded significantly more than all other varieties; its mean yield was 1,983 kg ha<sup>-1</sup>. There were no significant yield differences between the other varieties. Again the life cycle of the crop was extended beyond 90 days.

The second experiment in this trial, (data in Table 8) again showed Vita-3 yielding significantly more than the other varieties with 2071 kg ha<sup>-1</sup>.

Rainfall data recorded for the duration of Trials 3 and 4 are presented in Table 9. Total rainfall for planting dates 5 January, 15 January, and 18 January 1985 were 167.9, 167.4 and 220.3mm respectively. As mentioned elsewhere there was very little rainfall during the period immediately after the trials were planted. This may have delayed the crop somewhat hence the average number of days taken to harvest was increased from 84 for 1983–84 trials to between 91 and 97 for 1985 trials. Although the effects of the dry period have not been adequately

determined, indications were that this delayed the onset of flowering and hence maturity. The inadequate supply of water during vegetative growth decreases the rate of initiation of main stem leaves, (Summerfield *et al.*, 1984).

This would tend to reduce leaf area index. Maximum leaf area index (3 for determinate varieties) usually coincides with initiation or appearance of the first flowers in determinate varieties. Since the varieties used can be classified as determinate or semi-determinate it would be safe to assume that the dry period may have affected them in some way.

**Cooking quality**

Data in Table 10 indicate that Laura-B and California No. 5 were cooked within 15 minutes in the pressure cooker. For Vita-3 however, only 25 per cent of the grains were cooked at this time and even after 30 minutes only 95 per cent were cooked. It would therefore seem that Vita-3 is not an easily cooked variety.

Table 7: Data<sup>1</sup> on six cowpea varieties planted on 15 January, 1985 at Caricom farms Ltd.

Varieties	Days to 50% flowering	Days to harvest	Plant height (cm)	No. pods/plant	No. seeds/pod	Seed colour	100 grain wt. (g)	Yield	
								(g/plot)	(kg/ha)
Vitra - 3	59	93	59	12	13	Red	20.9	1,983	1,983 a
IT 82 <sup>D</sup> - 789	59	91	49	13	11	Brown	19.9	1,408	1,408 b
IT 82 <sup>D</sup> - 889	56	91	41	12	13	Red/Brown	18.6	1,307	1,307 b
IT 82 <sup>E</sup> - 18	59	94	53	11	11	Brown	18.6	1,259	1,259 b
California No. 5	59	90	52	15	10	Cream	20.0	1,288	1,288 b
Laura - B	62	89	50	16	9	Cream	15.4	1,191	1,191 b

<sup>1</sup> Values are the average of 3 replications.

Yields followed by same letter were not significantly different at P - 0.05 (DMRT) LSD - 444.4 kg/ha.

Table 8: Data<sup>1</sup> on six cowpea varieties planted January 18, 1985 at Caricom Farms Ltd.

Varieties	Days to 50% flowering	Days to harvest	Plant height (cm)	No. pods/plant	No. seeds/pod	Seed Colour	100 grain wt. (g)	Yield	
								(g/plot)	(kg/ha)
Vita - 3	N.A.	97	46	11	10	Red	21.6	2,071	2,071 a
IT 82 <sup>E</sup> - 18	57	96	47	13	10	Brown	20.5	1,688	1,688 b
California No. 5	54	96	51	14	10	Cream	21.1	1,666	1,666 bc
IT 82 <sup>D</sup> - 789	55	96	48	12	11	Brown	18.1	1,494	1,494 bcd
Laura - B	55	96	45	13	10	Cream	16.7	1,486	1,486 bcd
IT 82 <sup>D</sup> - 889	56	97	43	8	9	Dark Brown	14.7	1,237	1,237 d

<sup>1</sup> Values are the average of 3 replications.

Yields followed by same letters were not significantly different at P - 0.05 (DMRT) LSD - 336.8 kg/ha.

Table 9: Rainfall during crop development for cowpea planted in January 1985 at Caricom farms Ltd.

Days after planting	Stage of crop development	Rainfall (mm)		
		5 Jan planting	15 Jan. planting	18 Jan. planting
1 - 14	Seedling	4.5	11.2	21.9
15 - 28	Vegetative	21.9	1.7	6.7
29 - 42	Vegetative	6.7	65.1	62.1
43 - 56	Vegetative/flowering	62.1	33.4	62.1
57 - 70	Flowering/Podding	31.4	16.3	16.3
71 - 84	Podding	16.3	25.0	25.0
85 - 98	Maturity	25.0	14.7	56.9
Total		167.9	167.4	220.3
Av. no days to harvest		93	91	97

Table 10: Cooking evaluation of three cowpea varieties

Cooking time (min.)	% of grains cooked		
	Laura B	California 5	Vita 3
10	80	95	0
15	100	100	25
20	100	100	65
25	100	100	65
30	100	100	95

### Summary

Based on results obtained over the last two years (1983–85) the most consistent high yielder has been Vita-3 (See Table 11). In all trials it has yielded in excess of the equivalent of 1,600 kg ha<sup>-1</sup> of grain at 14 per cent Moisture Content and up to 2,000 kg ha<sup>-1</sup> once. It is red-seeded with an average of 100-grain weight of 20g. The plant type is semi-erect with pods within the canopy. It has been selected for testing on commercial size demonstration plots for mechanical harvesting.

Laura-B, a black-eye type, has also been selected for commercial testing. It has not yielded as high as Vita-3 but its potential lies in its being a substitute for the black-eyed California No. 5. It has never yielded below 1,100 kg ha<sup>-1</sup> in all the trials conducted along with Vita-3 and California No. 5 under five rainfall regimes (Table 11). California No. 5 seemed to perform better under low rainfall conditions. Since these conditions cannot be predicted with a great degree of accuracy, California No. 5 is therefore considered a high risk variety and its use is not being recommended for commercial production at CFL.

Other promising varieties from the 1985 trials, namely CNC-27E, CNC-0434 and TUNA-1180, will be further evaluated experimentally before commercial testing.

### The future of Cowpea production in Belize and CFL

Belize is 75 per cent self-sufficient in its production of grain legumes for human consumption (See Table 2). The bulk of this production being in the form of red kidney bean *Phaseolus vulgaris* (L.). Deficits at present are made up from imports from the neighbouring countries of Guatemala and Mexico with a small amount being imported from North America. There is hence little incentive to expand cowpea production on a large scale for local consumption.

The orientation of the Caricom Farms cowpea project is therefore a channel its research and development efforts towards the selection of varieties which are acceptable and can be marketed on the export markets, mainly the Caricom market. Barbados and Trinidad and Tobago are markets which can be targeted in the short term. Jamaica and Guyana although beset by money problems are also potential markets. The market size in 1983 was 1,100 tonnes for Barbados and Trinidad and Tobago and the demand should increase. This means that at least 1,000 ha of land for potential production for export needs to be tapped. Land for this is available in the Belize River Valley where the CFL project is located.

With this in mind the research programme is concentrating its efforts towards selection of suitable varieties and the development of production packages for commercial adaptation. It is possible that commercial varieties will be released within a year for use on CFL commercial fields. About 100ha will be grown at first with a projected expansion in 1991 of 400ha.

As far as the country of Belize is concerned, varieties now being tested will be shared with the government agencies responsible for research and development for possible evaluation in other districts. Successful testing could open up whole new production enterprises for farmers and potential foreign exchange earnings for Belize. The future therefore looks promising for cowpea production in Belize.

Table 11: Yield and rainfall during crop growth of three cowpea varieties at five different times of planting at Caricom Farms.

Planting date	Rainfall during crop (mm)	Yield (kg ha)		
		Vita - 3	Laura - B	California No. 5
1983 - 12 - 15	326	1,759	1,142	409
1984 - 01 - 05	210	1,685	1,156	976
1985 - 01 - 05	168	1,723	1,711	1,845
1985 - 01 - 15	167	1,983	1,191	1,288
1985 - 01 - 18	220	2,071	1,494	1,666

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