

Variability in Reaction of Ife Brown (Irawo) to the Cowpea Aphid-borne Mosaic Virus.

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Abstract

Cowpea (*Vigna unguiculata s.sp. unguiculata*) (L.) Walp. cv. Ife Brown showed genetic variability for resistance to cowpea aphid-borne mosaic virus. It was shown that Alabunch and Westbred, two Ife Brown parents, carry resistance genes to the virus in their populations. Two generations of individual plant selection in Ife Brown resulted in the production of four true breeding lines resistant to the cowpea aphid-borne mosaic virus.

Introduction

Virus diseases constitute one of the limiting factors in cowpea production in Nigeria. Ladipo (1975) reported the isolation of a strain of the cowpea aphid-borne mosaic virus (CAMV) in Nigeria similar to the vein-banding strain earlier reported from East Africa by Bock (1973). Susceptible seedlings have characteristic vein banding or mosaic symptoms (Ladipo, 1976). The virus severely limits plant growth and in many cases causes death.

Ife Brown is a widely grown cowpea cultivar in Nigeria developed by crossing Alabunch, Westbred and Local Brown (Franckowiak and Ojomo, 1974). Ife Brown shows varying levels of susceptibility to CAMV among individual plants within its population (Ladipo, 1976).

This paper reports on possible sources of resistance to CAMV in Ife Brown, the selection of four resistant lines within its population and their performance in yield trials.

Materials and Methods

The virus was maintained on C20-55 cowpea cultivar known to show the characteristic symptoms of CAMV. Infected plants were kept in an insect proof cage and from them inoculum was obtained by grinding young infected leaves with sterilized mortar and pestle in 0.02 m

phosphate buffer (pH 8.0). During each inoculation, virus free C20-55 plants and plants of two resistant cultivars (Seindere and Blackeye) were also inoculated. These served as a check on the infectiveness of the virus in the inoculum.

Five to ten seeds of plants to be inoculated were planted in 500 ml plastic cups in the greenhouse. When the seedlings were about one week old, the primary leaves were inoculated mechanically as described by Ladipo (1976). Ten days after inoculation the seedlings were scored for their reactions to CAMV.

In an experiment to check the reactions of Ife Brown parents to CAMV, nine Alabunch, 120 Westbred and 37 Local Brown seedlings were initially inoculated. Plants showing no symptoms were allowed to produce seeds and subsequently progeny tested.

118 single plant selections were made from Ife Brown population. Each plant (S_0) was progeny tested by planting five to ten seeds per cup and subsequently inoculating each seedling with CAMV. S_1 plants that were resistant were allowed to produce S_2 seeds. Each S_2 plant was again progeny tested to produce S_3 seeds. Twenty seeds of each S_3 plants were planted to progeny test the S_3 plants.

The four CAMV resistant lines selected from Ife Brown viz A44-2, B33, A55-2 and B29-2 were evaluated along with Ife Brown in three different preliminary yield trials. The first trial planted in May 1976 had four row plots spaced 0.35m apart and 16 plants per row with 0.25 m spacing between plants. The second and third plantings were carried out in August 1977 and May 1977 respectively. The former had seven 4m rows spaced 0.35m apart, while the latter had nine. In both cases, there were 16 plants per row and 0.25 m between plants on the row. Each planting was replicated five times in a randomized complete block design. Data collected included yield, number of pods, 100 seed weight and threshing percentage. Each trial was separately analysed because of the variable plot sizes and number of entries in each trial.

Results and Discussion

Of the nine Alabunch plants inoculated, one died, four had severe symptoms and four were free. The progeny of the four resistant Alabunch plants were all uniformly resistant. Eighteen of the twenty Westbred plants inoculated showed uniform, mild systemic reactions while two were free. The progeny of these free Westbred plants showed mild or no symptoms when inoculated. All the 37 Local Brown plants

when inoculated showed uniform systemic vein banding followed by mosaic reactions.

We concluded from the above that Ife Brown resistance was either from Alabunch or Westbred. Since the progeny of resistant Alabunch were all uniformly resistant to CAMV, the source of resistance in Ife Brown is most likely to be Westbred. In support of this speculation, some of the progeny of the two Westbred plants had trailing tendency also observed in some of the Ife Brown resistant plants.

The 118 S_0 plants (lines) selected from Ife Brown gave 61 CAMV symptom-free progenies. From the progenies of the 61 S_1 lines, 128 S_2 plants were obtained. Each S_2 plant was grown to maturity and progeny tested. The progeny of ten S_2 lines did not segregate and were all free of CAMV symptoms; they were allowed to produce S_3 seeds. When these S_3 seeds were progeny tested, they were all free of CAMV symptoms. These ten S_3 lines were therefore presumed to be true breeding CAMV resistant lines. On the basis of growth habit and vigour, four lines A44-2, A55-2 and B29-2 were selected for field evaluation.

In the may 1976 planting, there were no differences between lines for all traits (Table 1). However, in the August 1976 planting, B33 was superior to all the other lines in yield (Table 1). In the May 1977 planting, B29-2 was superior to all other lines (Table 1). At present, Ife Brown is planted in varying ecological zones in Nigeria; and since CAMV can cause death of susceptible plants, these lines will definitely add to the stability of cowpea field production.

The heterogeneity of Ife Brown allowed for the selection of resistant lines from this cultivar. This is one of the advantages of residual variability in self-pollinated crops (Allard 1960). This supports the preference of mass over pure line selection in self-pollinated crops.

TABLE 1 – YIELD AND OTHER TRAITS OF IFE BROWN AND ITS DERIVATIVES
IN FIELD TRIALS

Lines	Yield in 9m/row			100 Seed Weight (gm)		Pods/Plant			Threshing %		
	1	2	3	1	2	1	2	3	1	2	3
A55-2	111	90	141	14.1	13.2	14	10	13	71	77	52
B 33	124	132	142	14.8	14.6	16	13	13	69	78	52
A44-2	116	86	91	13.8	14.0	15	10	11	68	76	43
B29-2	120	101	159	14.6	13.3	16	13	14	72	74	53
Ife Brown	123	104	128	13.7	13.3	17	13	13	70	73	45
LSD at 0.05	6.0	16.1	7.30	1.0	2.6	5.5	6.0	4.5	4.0	6.5	15.5

1. 1976 May Planting
2. 1976 August Planting
3. 1977 May Planting

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