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Comparison of flowering time and embryo-genesis in four varieties of Cowpea [*Vigina unguiculata* (L) Walp) in a Southern guinea savannah environment

J.A. Awopetu

Department of Agronomy, University of Ilorin, Ilorin, Nigeria

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ABSTRACT: Investigations were carried out on floweing time and embryo morphogenesis in four improved cultivars of cowpea, bred in nigeria. Observations showed significant digferences in days to cotyledon drop, days to branchingdays to flowering as well as plant height at flowering. However, flowering time and eventual maturity time suggest early, medium and late maturing genotypes amongst the experimental material.

Key Words: Cowpea; Flowering time; Embryogenesis; Southern guinea savannah.

Introduction

Cowpea cultivarsserve as a major source of protein to the majority of the inhabitants of the developing countries of Africa and Asia who dread the cost of animal protein source. In this scenario, children are more vulnerable to under- nourishment and eventual under-development (Vickery and Vickery, 1979). Proximate analysis of cowpea generally by Kochlar (1986) revealed on the whole 12%, 24.6%, 6.7%, 55.7%, 3.8% and 3.2% moisture protein fats, carbohydrates, fibre and ash respectively. in nigeria, cowpea attracts higher prices than any other grain crops (Ezedinma, 1964).

The reproductive phase of cowpea is composed of overlapping periods of development of individual fruits, each lasting about 19 days (Wien and Ackah, 1978). The longer the reproductive period, the greater the number of pods that mature and consequently the larger the yield (Wien and Sumerfield, 1984). Genetic differences in the duration of reproductive phase are related to growth habit, with determinate cultivars of limited leaf areas senescing as early as 20 days after the onset of flowering while indeterminate cultivars require 45 days after flowering to senescence (IITA., 1974). The investigation carried out here attempts to compare developmental stages in four improved cultivars of cowpea so as to select individuals best adapted to a southern guinea savannah agro-ecosysytem.

Materials and Methods

The experimental material consisted of four improved cowpea cultivars (IT 84-124, IAR 48. Ife Brown and TVXL 25) obtained from the National Seed Centre, Ilorin Kwara State of Nigeria. The experimental layout was a randomised complete block design in three replicates.

Flowers of the same age were selected and tagged for studies. Such flowers were tagged on the day the standard petal was fully expanded as a reference date of flowering. Sampling of fruits were carried out at three days interval from the date of flowering. The following data were collected and subjected to analysis of variance. Data collected included:

Date of cotyledon drop (days after germination)
Plant height at branching.
Date of branching(days after germination)
Days to flowering (from date of sowing)
Pod length at 3 days interval
Pod breadth at 3 days interval
Seed length at 3 days interval
Seed breadth at 3 days interval
Data were subjected to analysis of variance and significant differences were identified with Duncan multiple range tests.

Results and Discussion

Table 1 shows some aspects of the vegetative growth phase of the experimental material. Values with the same letter marks in each column are not significantly different at 5% level of duncan multiple range test.

Tables 2, 3, 4 and 5 refer to the respective embryo morphogenesis of in the cowpea cultivars. Figures 1-4 are the graphical illustrations of the embryogenesis of the reproductive phase of the cultivars. Variations in the behaviour of the cowpea varieties in the vegetative and reproductive phases may not be unconnected with the genetic composition of the cultivars.

Previous work by Rehana *et al* (1990) in lupinus lutens L., Nelson (1998) in soyabean and Ogunbodede and Fatula (1985) in cowpea indicated similar trends in the respective legumes. Significant differences in the mean flowering time in the cowpea varieties agree with the findings of chandhry (1981). However, Haxley and summerfield (1974) reported that flowering time in cowpea may be influenced by photoperiod. Porter *et al* (1974) observed variations in plant size at flowering time but pointed out that this fact has relatively little effect on economic yield.

Variation in pod/seed length and pod/seed breadth as illustrated in Figs 1-4 suggest differential potential in the rate of morphogenesis in the period between germination and flowering and eventual pod maturaton among the four cowpeas variesties. Such variations could however be due to differential responses to enviromental factors related to photoperiod probably due to the genetic composition of individual cultivar. This agrees with the finding of Awopetu (1988) in Iberian *Lupinus albus* L. when comparing the flowering time and embry-ogenesis of the legume. Previous work by Egli *et al*(1975) and by Gent (1983) follow similar trends. All these facts will be of selective advantage among the cowpea cultivars in tentatively categorizing them to early, medium and late maturing cultivars in tentatively categorizing them to early, medium and late maturing cultivars as portrayed by OT84E-124, Ife brown, I A R 48 and TVXL 25 in that order (see Table 1).

Table 1: Showing the mean days to Cotyledon drop (dc), mean days to Branching (db), mean height at Branching in cm (hb), mean days to Flowering (df), mean height at Flowering in cm (hf)

Variety	Dc	Db	Hb	Df	hf
IT84E-124	8.833a	33.167a	116.056b	36.667b	20.607b
IAR48	8.667a	31.667b	18.073a	40.833a	26.073ab
Ife Brown	7.667b	31.667b	15.783b	39.883a	23.83oab
TVXL 25	7.500b	32.667a	17.000ab	42.500a	30.773a

Mean value with the same alphabets are not significantly different at 5% duncan multiple range test.

Table 2: Means of Pod Length

Variety/days	3	6	9^{NS}	12^{NS}	15^{NS}	18^{NS}	21^{NS}	24^{NS}	27^{NS}	30^{NS}
IT84E-124	5.250a	10.733a	12.860	15.153	16.970	17.000	16.020	15.010	14.040	13.880
TVXL 25	4.943a	9.733ab	11.283	13.057	15.540	15.967	1.383	14.057	13.650	13.147
Ife Brown	4.077b	7.967c	11.183	12.780	13.383	13.217	12.917	12.280	12.083	11.170
IAR 48	3.760b	8.650b	12.067	15.000	14.723	15.200	14.350	13.707	13.493	13.293

NS = No Significant Difference

Table 3: Means of Pod breadth

Variety/ days	3^{NS}	6^{NS}	9^{NS}	12^{NS}	15	18^{NS}	21^{NS}	24	27	30^{NS}
IT84E-124	0.263	0.467	0.623	0.740	0.837a	0.820	0.800	0.787a	0.743a	0.717
TVXL 25	0.243	0.433	0.557	0.683	0.777b	0.763	0.690	0.643c	0.640b	0.657
Ife Brown	0.233	0.403	0.561	0.657	0.803ab	0.813	0.717	0.657c	0.643b	0.630
IAR 48	0.210	0.367	0.613	0.700	0.830a	0.803	0.743	0.723b	0.703a	0.690

NS = No Significant Difference

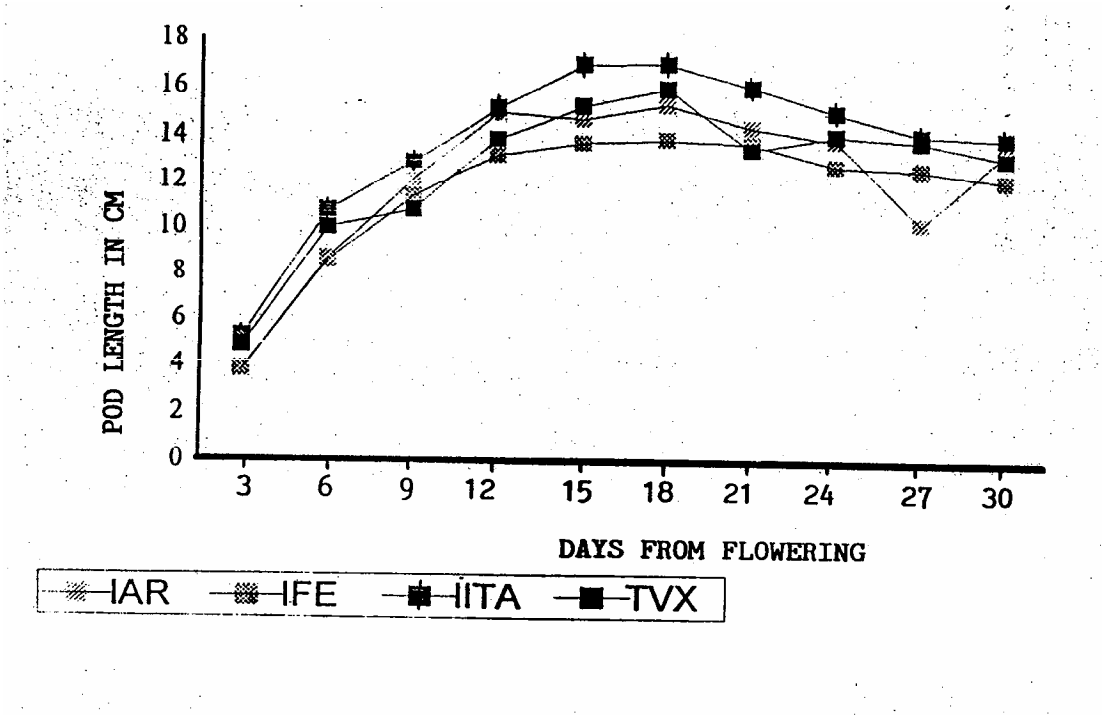

Fig 1: Graph of pod length against days from flowering.

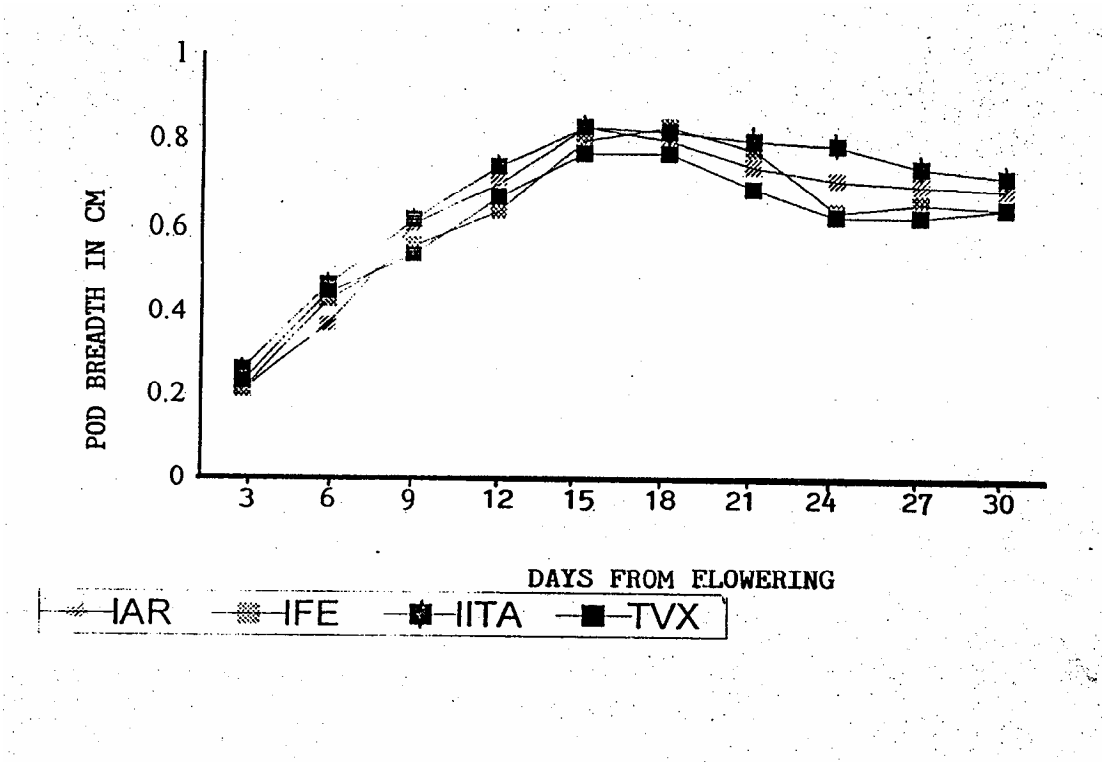

Fig. 2: Graph of pod breadth against days from flowering.

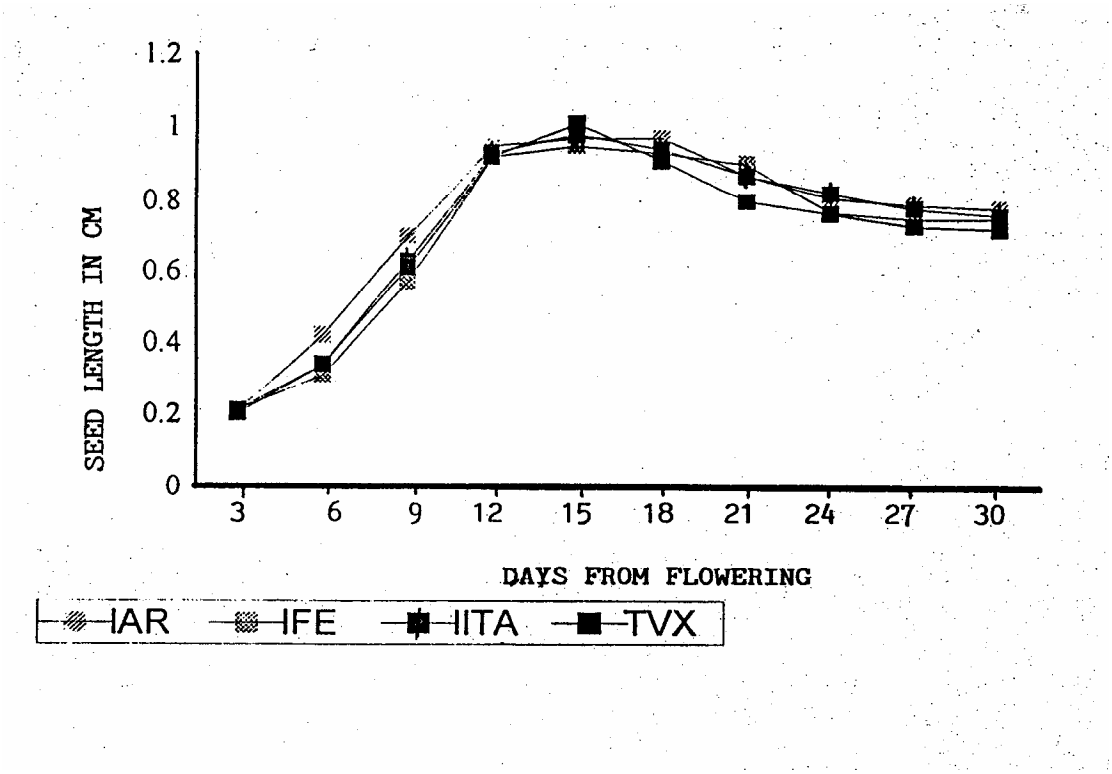

Fig. 3: Graph of seed length against days from flowering.

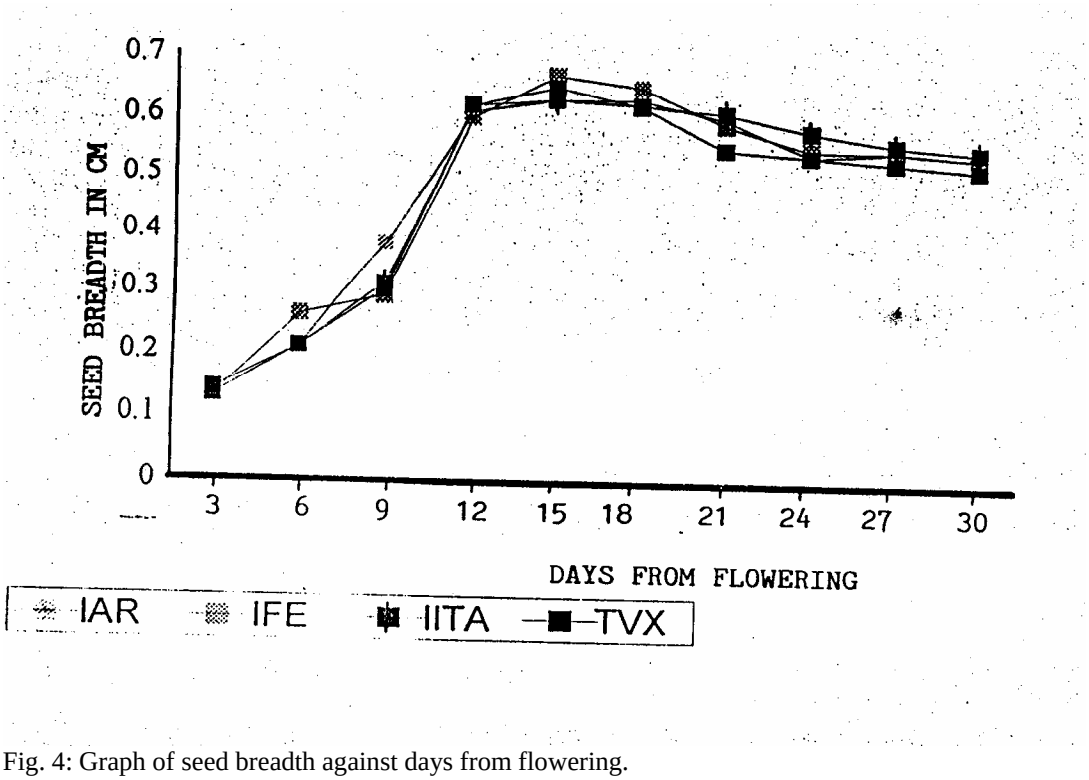

Fig. 4: Graph of seed breadth against days from flowering.

Table 4: Means of Seed Length

Variety/ days	3^{NS}	6^{NS}	9	12^{NS}	15^{NS}	18^{NS}	21^{NS}	24^{NS}	27^{NS}	30^{NS}
IT84E-124	0.200	0.337	0.630b	0.983	0.983	0..940	0.873	0.823	0.780	0.757
TVXL 25	0.207	0.343	0.600bc	0.977	0.977	0.917	0.793	0.757	0.733	0.717
Ife Brown	0.213	0.307	0.567c	0.940	0.960	0.917	0.910	0.773	0.757	0.743
IAR 48	0.207	0.423	0.703a	0.947	0.970	0.979	0.870	0.813	0.793	0.780

NS = No Significant Difference

Table 5: Means of Seed breadth

Variety/days	3^{NS}	6^{NS}	9	12^{NS}	15^{NS}	18^{NS}	21^{NS}	24^{NS}	27^{NS}	30^{NS}
IT84E-124	0.133	0.210b	0.307b	0.620	0.627	0.623	0.619	0.567	0.560	0.553
TVXL	0.140	0.210b	0.297b	0.607	0.633	0.583	0.567	0.537	0.533	0.520
Ife Brown	0.113	0.260a	0.287b	0.603	0.650	0.640	0.597	0.553	0.534	0.530
IAR 48	0.127	0.213b	0.377a	0.613	0.630	0.627	0.597	0.567	0.547	0.540

NS = No Significant Difference

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