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Dry Matter Production and Harvest Index Trends in Groundnut (*Arachis hypogaea* L.)

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Studies on dry matter production and harvest index in a number of bunch, semi-spreading and spreading types of groundnut revealed that a few varieties in each type can be identified as top performers. Such varieties can serve as basic material to initiate crossing programmes to improve the yield performance of the crop.

Groundnut crop which has been rightly classified as "unpredictable legume" has not yielded so far to the attempts of the breeder in breaking its yield barrier. The investigations hereunder reported have been undertaken to gain certain insight into the physiological processes which contribute towards greater productivity and which in turn may help the breeder in his choice of appropriate parents for crossing programmes.

The first pre-requisite for any high yielding crop plant is its ability to produce higher amounts of total dry matter as compared to other cultivars which are classified as low yielders. Another equally important expression which can help to spot out potential high yielders is the 'coefficient of effectiveness' or the 'harvest index', denotes the relationship that exists between economic yield and the total yield which is also known as biological yield (Nichiporovic, 1960).

In the present study, the above mentioned two parameters which are intimately involved in the process of productivity has been investigated in a number of varieties of groundnut and results discussed.

MATERIAL AND METHODS

Experiments were conducted in Millet Breeding Station, Agricultural College and Research Institute, Coimbatore and groundnut varieties consisting of ten bunch, eleven semi-spreading and two spreading types were raised. Samples were drawn from 25 days onwards at 10 day intervals for the dry weight determinations. Harvest index was computed at the harvest stage of the crop. Plants were picked out at random and the mean of five plants was worked out for each variety.

RESULTS AND DISCUSSION

(i) **Dry matter production :** The data on total dry matter production indicate that among the three types of groundnut, each variety irrespective of the type to which it belongs to is capable of producing the maximum dry mat-

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ter at a particular stage of its growth cycle (Table I).

Among the bunch types, TMV.2 is the highest total dry matter producer and the maximum is obtained in the course of 85 days possible because it grows vigorously. There are two varieties which register the maximum dry matter accumulation in semi-spreading types., viz., TMV.8 and TMV.10. This accumulation is observed to occur in the course of 65 and 85 days respectively in above two varieties. The best among the spreading types is M.13 which happens to reach its maximum level in dry matter production in about 85 days (Table I).

When the total dry matter production is computed as per day production,

TABLE I. Dry matter production (DMP) in groundnut varieties (Mean of five plants)

BUNCH			SEME-SPREADING			SPREADING		
Time taken for maximum DMP (in days)	Varieties		Time taken for maximum (DMP (in days)	Varieties		Time taken for maximum DMP (in days)	Varieties	
65	A.h.8068	(20.2)	65	TMV.8	(48.8)	85	M.13	(50.6)
	TMV.7	(27.9)		GNLM	(20.0)			
75	OSN.1	(28.3)	75	A.h.7243	(31.9)	95	TMV.4	(33.6)
				C.501	(27.5)			
85	TMV.2	(33.7)	85	TMV.10	(48.8)			
	POL.2	(26.8)		A.h.7456	(36.3)			
	A.h.7917	(29.7)		Kopergaon	(33.1)			
10	TMV.9	(29.9)	95	TMV.6	(30.5)			
	OSN.2	(26.5)		A.h.1728	(43.0)			
	POL.1	(20.7)		B.3	(37.4)			
	A.h.7911	(24.3)		R.S.87	(33.4)			

(Figures in parentheses indicate the maximum dry matter produced in g/plant)

TABLE I. Per day dry matter production (DMP) in groundnut varieties (Mean of five plants)

BUNCH Per day		SEMI-SPREADING Per day		SPREADING Per day	
Variety	DMP/plant in g.	Variety	DMP/plant in g.	Variety	DMP/plant in g.
TMV.7	0.42	TMV.10	0.57	M.13	0.59
TMV.2	0.39	A.h.1728	0.45	TMV.4	0.35
OSN.1	0.37	TMV.8	0.42		
A.h.7917	0.34	A.h.7456	0.42		
POL.2	0.31	A.h.7243	0.42		
		B 30	0.39		
A.h.8068	0.31	Kopergaon	0.38		
TMV.9	0.24	C.501	0.36		
OSN.2	0.24	R.S.87	0 35		
POL.1	0.18	TMV.6	0.32		
		GNLM	0.30		

TABLE III. Harvest Index in Groundnut varieties (Mean of five plants)

BUNCH		SEMI-SPREADING		SPREADING	
Variety	HI (in percentage)	Variety	HI (in percentage)	Variety	HI (in percentage)
OSN.1	47	TMV.10	31	M.13	22
A.h.8068	44	C.501	26	TMV.4	10
OSN.2	43	TMV.6	26		
TMV.7	38	TMV.8	21		
POL.2	36	Kopergaon	20		
TMV.9	33	R.S.87	20		
A.h.7911	30	A.h.7243	19		
POL.1	25	A.h.1728	18		
TMV.2	20	GNLM	13		
		B.30	12		
		A.h.7456	3		

it becomes apparent that TMV.7 (bunch), TMV. 10 (semi-spreading) and M. 13 (spreading) are the most efficient among the different varieties in the three types under investigation (Table II). High dry matter production in the above varieties normally indicates their potentiality to yield higher economic product (pods) provided there is proper partitioning of dry matter distribution. Such a critical role for the dry matter production in plants is also envisaged by Arnon (1975) who states that a considerable increase in the yield of economic product is usually dependent on an increase in the total dry matter production.

(ii) Harvest index : The above parameter is found to express itself best in OSN.1 (Bunch), TMV.10 (Semi-spread- and M.13 (spreading) among three types studied (Table III).

When the data on per day dry matter production and harvest index are considered together, it is understood that among the bunch types, eventhough TMV.7 registers maximum per day dry matter production (0.42 g.) its harvest index is only 38, due to ineffective partitioning between vegetative and reproductive structures resulting in comparatively low economic yield. On the other hand, OSN. 1 with a per day dry matter production of 0.37 g only induces a very high harvest index (47) indicating a favourable partitioning of dry matter towards pods. Similar trend in dry matter production has been observed by Thorne (1966) who is of the opinion that when biological yield is limited by external conditions, this does not always imply that economic yield will be reduced, as surplus carbohydrates may move to the grain. It is also observed in TMV.10 (semi-spreading), there is a well co-ordinated stream in partitioning of dry matter which results in high harvest index coupled with high dry matter production.

The varieties identified in the present investigation possess favourable physiological traits in regard to dry matter production and harvest index and these can profitably be utilised as breeding materials in crossing programmes intended to achieve crop improvement objectives.

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