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Dry matter accumulation and its partitioning in association with seed yield and harvest index in greengram (*Vigana radiata* (L.) Wilczek) genotypes

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Experiment was carried out with six genotypes of greengram (*Vigna radiata*) viz., 2KM 13 , 2KM 17, 2KM 19, 2KM 33, 2KM 32 and Malviya jyoti at college of agriculture IGAU, Raipur (C.G.) during *kharif* season 2002, in randomized block design (RBD) with four replications to study the dry matter accumulation and its partitioning with respect to seed yield and harvest index. Study revealed that dry matter accumulation in different plant components increased upto maturity. Among all the genotypes 2KM 33 showed higher dry matter accumulation per plant and also higher value of seed yield and harvest index.

Key words : Greengram, Genotypes, Seed yield, Harvest index.

INTRODCTION

Dry matter production is an important yield determining and judging factor in field crops particularly in legumes. The increase in dry matter of legumes depends primarily on the equilibrium between photosynthesis and respiration (Yadav, 2001). Dry matter accumulation and harvest index are two major physiological parameters controlling the productivity of legumes. Study of pattern of dry matter production and its distribution in the different plant parts would give a better understanding of the genotypes in relation to its economic productivity. The productivity of legumes can be physiologically improved through selection traits for either dry matter accumulation or for harvest index or both (Patil *et al.*,1997). Thus the present investigation carried out to study the dry matter distribution pattern and its association with seed yield and harvest index in greengram genotypes.

MATERIALS AND METHODS

The experimental material comparised of six greengram genotypes. The experimental trail was carried out in a randomised block design (RBD) with four replication at college of Agriculture, IGAU, Raipur (C.G.). Every genotype sown in six rows was considered as a plot. Each experimental plot had gross plot size 4 x 2.4 m. The row to row and plant to plant spacing was 30 and10 cm respectively. Observations were recorded on five randomly selected competitive plants from each plot for total dry mater accumulation in each parts at vegetative, flowering and maturity stage. Pod dry weight was recorded at pod initiation and at maturity stage. Harvest index was calculated as suggested by Donald (1962).

RESULTS AND DISCUSSION

Statistical analysis revealed significantly differences among all the genotypes for dry matter accumulation in all plant parts viz., leaves, stem and root dry weight, at all growth stages (Table 1 and Fig. 1). Genotype 2KM 13 showed highest leaves dry weight at vegetative stage, while at flowering and maturity stage genotype 2KM 17 attained highest leaves dry weight. Genotype 2KM 32 observed lowest leaves dry weight at all growth stages. Data also revealed that, among all the genotype 2KM 33 attained highest stem dry weight at vegetative, flowering and maturity stage. At all growth stages 2KM 32 shows lowest dry weight of stem. Regarding the root dry weight Table shows that, genotype 2KM 17 attained highest value at vegetative, flowering and maturity stage, respectively. Genotype 2KM 19 exhibited lesser dry weight at every growth stage.

Among all the genotypes 2KM 33 and Malviya jyoti exhibited the highest and lowest pod dry weight at pod initiation and at maturity stage, respectively. Genotype 2KM 17 and 2KM 13 were at par with each other at each stage of observation.

Total plant dry weight differed significantly from vegetative to maturity stage (Table 2). Among all the genotype, 2KM 33 was found to be associated with highest dry weight per plant at vegetative and maturity stage, while

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Table 1: Dry matter accumulation of leaves, stem and root of greengram genotypes (g)

Genotypes	Growth stages S1			S2			S3		
	Leaves	Stem	Root	Leaves	Stem	Root	Leaves	Stem	Root
2KM 13	5.8300	4.2900	0.8900	6.1900	8.2700	1.2900	6.5900	8.0500	1.7000
2KM 17	4.8000	3.9000	1.1200	8.6800	7.6500	1.9900	9.1300	7.9300	2.3200
2KM 19	4.8200	3.7200	0.7200	6.4000	7.1100	0.8500	6.9700	7.1900	0.9400
2KM 33	5.6700	5.6200	1.1100	7.8100	10.2700	1.7400	8.5100	10.7200	2.2800
2KM 32	5.3800	3.5700	0.6100	6.9700	5.6600	1.0500	7.6700	5.6800	1.1200
Malviya jyoti	3.3300	3.9200	0.8600	5.7600	7.7900	1.1300	6.4100	7.2800	1.2400
SEm±	0.2797	0.2034	0.0319	0.2317	0.2981	0.1237	0.2101	0.5663	0.0976
CD at 5%	0.8400	0.6100	0.1000	0.7000	0.9000	0.3700	0.6300	1.7100	0.2900

at flowering stage genotype 2KM 17 was observed to have highest total plant dry weight. Genotype 2KM 32 found to have lowest value at vegetative and flowering stage. At maturity stage genotype Malviya jyoti exhibited lowest total plant dry weight.

The dry matter accumulation in leaves increased progressively upto maturity. The genotype 2KM 17 attained higher dry weight at all growth stage excepts vegetative stage, it might be due to maximum number of leaves, thick size and also due to major share of its assimilate contribution for growth of leaves which resulted in accumulation of more dry matter of leaves (Saini and Das, 1979). Genotype 2KM 17 also exhibited higher root dry weight. It might be due to an enlargement of primary root and the concentration of root hairs and nodule tissue on roots. The stem dry matter accumulation per plant increased with the advancement of the age of all the genotypes. Genotype 2KM 33 exhibited higher stem dry weight due to maximum width of stem as well as longer internodes and this genotype produced higher grain yield per hectare than other genotypes hence stem dry matter was also considered as an important yield contributing factor. Pod dry weight increased up to maturity stage in all the genotypes. The genotype 2KM 33 attained higher pod dry weight than all genotypes which might be due to higher sink capacity of pods, more number of pods, maximum length of pods and also due to early fertilization and early formation of pods (Thirathon *et al.*,1987).

The total dry matter accumulation per plant showed

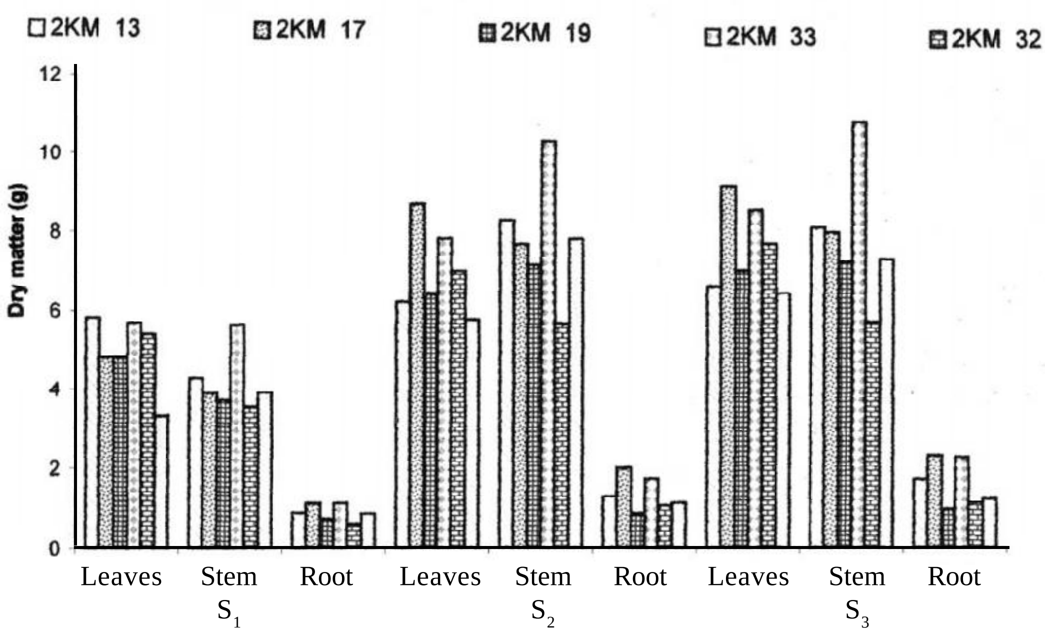

Fig. 1 : Dry matter accumulation of different components of greengram genotypes.

Table 2 : Total dry weight $plant^{-1}$ (g), seed yield and harvest index of greengram genotypes.

Genotypes	Dry matter (g/plant) Growth stage			Seed yield ha^{-1} (qt.)	Harvest index (%)
Growth stages	S1	S2	S3		
2KM 13	10.0900	15.7100	24.8600	8.9000	22.3500
2KM 17	10.4300	20.8500	30.8500	9.0700	24.5200
2KM 19	9.3000	14.4700	36.2700	10.9300	24.5800
2KM 33	12.5500	17.2200	43.5900	12.4600	32.8000
2KM 32	7.6800	12.9900	26.8300	8.3200	21.2400
Malviya jyoti	10.3300	15.0600	22.2600	7.9400	16.8800
SEm±	0.4027	0.5031	0.5585	0.1653	0.8869
CD at 5%	1.2100	1.5200	1.6800	0.5000	2.6700

progressively increasing trends in all the genotypes upto maturity stage. The mean dry matter per plant of high yielding genotype was higher than low yielding genotype. High yield of genotype mainly depends on enhanced rate of dry matter partitioning, translocation and accumulation of assimilates in stem and reproductive parts. Genotype 2KM 33 was found as a higher dry matter accumulator among all the genotype. These findings are related to work carried out by Pawar and Bhatia (1980) in mungbean, Thirathon *et al.* (1987), Deshmukh *et al.* (1991) in soybean, Pansuriya *et al.* (1998) in pigeonpea.

Genotype 2KM 33 was found to be a higher yielder in respect to seed yield and harvest index due to higher sink capacity of this genotype, faster translocation of photoassimilate towards developing pods and higher dry matter in pods these results are related to findings of Singh (1980) in greengram, Natarajan and Palaniswamy (1988) in mungbeen, Vijyalakshmi *et al.*, (1993) in blackgram, Pansuriya *et al.*, (1998) in pigeonpea.

From above stated results and discussion, it is concluded that seed yield mainly depends on the stem, pods and total dry matter in greengram. However in further steps towards depth study is needed and suggested to prove or disprove some of the hypothesis forwarded in present study and evaluate the interrelationship between dry matter and seed yield in greengram genotypes.

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