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DRY MATTER PRODUCTION AND DISTRIBUTION IN BUNCH GROUNDNUT VARIETIES AS INFLUENCED BY THE TIME OF SOWING AND FOLIAR APPLICATION OF NITROGEN AND IRON*

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The pattern of dry matter production and its distribution in different plant parts of bunch varieties of groundnut due to variations in time of sowi g and nutrient spray was studied at Agricultural College farm, Dharwad, during the summer season of 1976. with successive delay in date of sowing from 25th January to 24th February the total dry matter production, dry matter accumulation in pods at harvest, rate of dry matter accumulation and leaf area index at early stages increased markedly. The 10th March sowing recorded the lowest total dry matter production (18 77 g/plant) and its accumulation in pods (11.09 g/plant) at harvest. These variations were caused due to variations in weather conditions like rainfall, temperature, day length, light intensity humidity and sunshine. Dry matter production and its accumulation in pods was highest in TG 3 variety followed by Rs-12. TG-3 also recorded the highest leaf area index and leaf area duration at all the stages of growth and consequently it recorded the highest rate of dry matter accumulation at all the stages except at 91 days to harvest.

Groundnut is an important oil seed crop of Karnataka State grown as a rain-fed crop in *kharif* season and as an irrigated crop during summer season on light textured soils. With increased irrigation facilities it is being grown under irrigation on a wide range of different soils especially on black soils in the Ghattaprabha, Malaprabha and Tungabhadra project areas. The yields of bunch groundnut on black soils are low due to lack of a suitable high yielding variety, knowledge about the optimum time of sowing and on the problem of iron chlorosis. Economic yield depends on the greater distribution of total dry matter into the economically useful portion. Differences in dry matter accumulation and distribution were observed due to variations in seasons (Chandrasekhar Reddy, 1976) and in different varieties (Marani *et el*., 1961), the studies on the effect of time of planting and iron chlorosis in bunch groundnut varieties raised on black soil under irrigation on growth components are not comprehensive in the present investigation attempts have been made to establish the differences in dry matter accumulation and its distribution in different plant parts of bunch varieties of groundnut due to variations in time of sowing and nutrient spray.

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MATERIAL AND METHODS

A field experiment was conducted at Agricultural college farm Dharwad, during the summer season of 1976 with four dates of sowing (D_1-25th January 1976 D_2-9th February D_3-25th February and D_4-10th March 1976) and five varieties (V_1-Spanish . Improved., V_2-DH_4-30, V_3-RS-12.. V_4-Hippargi-2-14.,and V_5- TG—3) with two foliar spray treatments(S_0—unsprayed control, and S_1—foliar spray of 2 percent urea and 0.5 per cent ferrous sulphate at 90 and 100 days) The experiment was laid out in split plot design with four replications in 3 0 mX 2.5 m size sub-sub plots N,P. 0_2 and K_20 at the rate of 20:40:20 kg per ha in the form of ammonium sulp hate, single superphosphate and muriate of potash, respectively were applied at the time of sowing in band placement 5 cm away and 5cm deep from the seed line. Two seeds per hill were dibbled by providing 25 cm spacing between rows and 10cm spacing between two plants within a row. After 15 days of sowing, the plants were thinned out, so as to maintain single plant at each spot. Inter-cultivations and hand weeding operations were carried out to control weeds. Timely plant protection measures were taken to check diseases and pest infestation. Foli ar sprays of urea (2 per cent) and ferro us sulphate (0 5per cent) were given twice, at 90 and 100 days after sowing as per treatment. At each spray, 700 litres of spray solution per hectare was used. Calcium hydroxide(1per cent) was added to the spray mixture to neutralise the acidity and prevent scorching of leaves. About 8 to 10 drops of ,Teepal' (a sticking agent)per 12 litres of spray solution was added. Measured and equal quantity of water was given to all the treatments with 6 cm depth of irrigation water, when the available soil moisture in the 0 to 30 cm layer reached 50 per cent depletion. Four plants at random from each net plot were pulled out they were partitioned in to different arts such as haulms, leaves, roots and pods and the dry weight of different parts was obtained by drying in a hot air even at 80°c for two days and the total dry matter accumulation and distribution into various plant parts were worked out. The leaf area per pant was worked out by disc method on dry weight basis as per the procedure suggested by Vivekanandan et al (1972). These figures were used to compute growth attributes like leaf area index and leaf area duration (Power et al.1967), Net assimilation rate (Gregory, 1926) and crop growth rate (Watson. 1952).

RESULTS AND DISCUSSION

Influence of date of sowing: Differences in total dry matter production and its distribution in haulms and pods at harv est due to dates of sowing were significant (Table I. The highest total dry matter of 26 16 g per plant was recorded with 9th February sowing and the lowest was in 10th March sowing. The 9th February sowing enhanced the total dry matter production by 1.2, 4.3 and 39.4 per cent over 25th January, 24th February and 10th March sowing respectively. The 9th and 24th February sowings recorded significantly higher dry matter accumulation in pods compared to other dates of sowing. The 10th March sowing recorded the lowest dry

matter accumulation in pods. The dry matter accumulation in haulms was significantly higher in 25th January sowing as compared to other dates of sowing. As all the dates of sowing have received similar cultural and management practices, it can be inferred that weather conditions like rainfall, temperature, day length light intensity, humidity, sunshine might have caused variability in total dry matter production and its distribution in different plant parts

Performance of varieties.

The total dry matter production and its distribution in pods at harvest differed significantly among the varieties (Table I). The dry matter production and its accumulation in pods was highest in TG-3 followed by RS-12 and both these varieties were significantly superior to DH. 3-30, Hippargi-2-14 and Spanish Improved. The percentage distribution of dry matter in pods was more in the variety TG-3 at harvest compared to other varieties. Williams *et al.* (1975) observed that pod yield depends much on the quantum of distribution of assimilates into vegetative and reproductive components. As such, a variety which makes little vegetative growth during reproductive phase is efficient in accumulating more dry matter in the pods.

Maintenance of optimum to higher leaf area and leaf area index throughout the growing season is important for higher photosynthetic efficiency which in turn enhances the dry matter production and eventually helps to increase the pod yield. TG-3 recorded the highest leaf area index and leaf area duration at all the stages of growth (Table II), and consequently it recorded the highest rate of dry matter accumulation at all the stages except at 91 days to harvest (Table I). Net assimilation rate and crop growth rate were also highest in TG-3 between 31 to 50 days (Table II). Net assimilation rate and crop growth rate between 61 to 90 days of sowing were highest in DH-30 followed by TG-3, These seem to have contributed in attaining pod yield of DN 3-30 on par with TG-3 In addition, thecrop growthrate between 31 to 60 days was highest in TG-3 which al so might have contributed to the enhanced dry matter accumlation in pods.

Effect of foliar spray of ferrous sulphate and urea :

Foliar spray of ferrous sulphate and urea recorded significant increase in total dry matter production and its accumulation in pods at harvest over unsprayed control (Table 1). The beneficial effect of foliar spray of ferrous sulphate and urea was exhibited in the recovery of chlorosis. The results are in agreement with the findings of Khatri and Singh (1969) who reported that ferrous sulphate was the most effective for foliar spray to correct iron chlorosis in groundnut. Thus in this investigation combined application of ferrous sulphate and urea helped in correcting the chlorotic symptoms to a greater extent and thereby increased the dry matter accumulation in haulms, leaves and pods and total dry matter production.

Table 1. Total dry matter production dry matter accumulation in haulms, leaves, roots and pods (g/plant) at harvest and rate of dry matter accumulation as influenced by dates of sowing, varieties and nutrient sprays

Treatments	Total dry matter production (g/plant)	Dry matter accumulation (g/plant)				Rate of dry matter accumulation (g/plant/day)			
		Haulms	Leaves	Roots	Pods	1-30 days	31-60 days	61-90 days	91 days to harvest
Dates of sowing									
25th January	25.85	7.96	6.32	0.53	12.08	0.03	0.28	0.37	0.17
9th February	26.16	6.85	4.11	0.48	15.17	0.05	0.32	0.23	0.28
24th February	25.08	7.32	2.08	0 39	15.34	0.11	0.28	0.25	0.16
10th March	18.77	7.17	0.00	0.52	11.09	0.16	0.21	0.20	0.04
CD at 5%	2.18	0 40	—	NS	1.54	0.01	0.04	0.09	0.09
Varieties									
Spanishi Improved	21.60	7.10	2.61	0.49	11.29	0 09	0.24	0 24	0.12
DH 3-30	23.18	7.03	2.69	0 46	13.08	0.08	0.27	0.30	0.11
RS-12	25.56	7.14	2 91	0.47	15.04	0.09	0.26	0.26	0.23
Hippargi-2-14	23.01	7.40	3.12	0.48	11.98	0.08	0.27	0 20	0.21
TG-3	26.58	7.93	3.16	0.49	15 67	0.10	0 32	0.31	0.12
CD at 5%	2.00	0 46	—	NS	1.52	0 01	0 03	0.05	0.07
Nutrient sprays									
No spray (control)	23 18	7.10	2 82	0.48	12.64				
Ferrous sulphate + Urea spray	24 78	7.03	2.94	0.48	14 18				
CD at 5%	0.64	0.17	—	NS	0.67				

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Table 2 Leaf area index, leaf area duration (days), net assimilation rate and crop growth rate as influenced by dates of sowing, varieties and nutrient sprays

Treatments	Leaf area index			Leaf area duration (days)	Net assimilation rate (g/dm²/day)		Crop growth rate (g/dm²/day)	
	30 days	60 days	90 days	31-90 days	31-60 days	61-90 days	31 60 days	61-90 days
Dates of sowing								
25th January	0.45	3.63	4.71	154.22	0.07	0.036	0.16	0.14
9th February	0.78	3.51	3.92	140.97	0.07	0.025	0.15	0..09
24th February	1.39	3.64	4.12	165.39	0.05	0 026	0.12	0.10
10th March	2.05	3.62	2.74	143.79	0.03	0.026	0.09	0.08
CD at 5%	0.22	NS	0.74	NS	0.01	0.006	0.02	0 02
Varieties								
Spanish Improved	1.21	3.37	3.85	151.76	0.06	0.026	0.11	0 09
DH 3-30	1.11	3 69	3 82	147.81	0.05	0 034	0.13	0.13
RS 12	1.24	3.51	3.86	153.06	0.05	0.028	0.12	0 10
Hippargi-2-14	1.00	3.47	3.42	132.34	0.06	0.022	0.14	0.07
TG-3	1.28	3.97	4 43	171.24	0.06	0.031	0 15	0.12
CD at 5%	0.24	0.42	0.46	15.34	NS	0 006	0.02	0.02