Short communication

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Weed dynamics and yield of groundnut as influenced by varieties and plant population

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Maintenance of optimum plant population with suitable variety not only reduces weed growth, but also realizes higher yield. Short statured plants with wider plant spacing encourage weed growth in groundnut and *vice versa*. Therefore, the present investigation was carried out to study the influence of varieties and plant populations in early *Kharif* groundnut on weed growth.

A field experiment was conducted during early *Kharif* 2013, in sandy-loam soil of wetland farm of Sri Venkateswara Agricultural College, Tirupati, Andhra Pradesh. The experiment was laid out in a factorial randomized block design and replicated thrice.Four groundnut varieties, *viz*. '*Abhaya'*, '*TAG-24,*' '*Dharani'* and '*Kadiri-6'* and four plant populations, *viz*. 3.33, 4.44, 5.00 and 0.67 million/ha were used to study the weed suppressing ability of different varieties at varied plant populations. The soil was low in available nitrogen (225 kg/ha) and phosphorous (23.7 kg/ha); and medium in potassium (264 kg/ha) and low in organic carbon (0.18%). The sowing of groundnut varieties was done on 13 May, 2013. A uniform dose of 20 kg N, 40 kg P_2O_5 and 50 kg K_2O per hectare was applied through urea, single super phosphate and muriate of potash, respectively to all the plots as basal dose. The remaining 10 kg of N was applied as top dressing in the form of urea at 30 DAS. Gypsum was applied in pod zone at 500 kg/ha at 40 DAS to avoid pops. The rest of the package of practices were adopted as per recommendations of the University.

The varieties '*TAG-24,*' '*Kadiri-6'* and '*Dharani'* were harvested on 30 August, 2013 and the variety '*Abhaya'* was harvested on 1 September, 2013. The unweeded check plots were also maintained separately for all four varieties at recommended plant population of 0.33 m/ha to observe weed growth and yield. These plots were allowed to remain infested with weeds till harvesting of the crop. Density and dry weight of grasses, sedges and broad-leaved weeds were recorded in the experimental plots and unweeded check plots at the time of harvest. Density and dry weight of weeds were transformed to square root ($\sqrt{X + 0.5}$) transformation to normalize their distribution. The number of filled pods/plant, pod and haulm yields of groundnut were recorded at harvest.

The major weed species that were found in the experimental plots were *Cyperus rotundus* L., among sedges, *Digitaria sanguinalis* L. Scop. among grasses and *Boerhavia erecta* L., *Cleome viscosa* L., *Celosia argentea* L., *Commelina benghalensis* L., *Digera arvensis* L., *Eclipta alba* L. Hassk. and *Trichodesma indicum* R.Br. among broad-leaved weeds.

Effect of varieties and plant population on weed growth

The groundnut cultivars significantly influenced the density and dry weight of weeds associated with the crop. The lowest density and dry weight of all the categories of weeds were significantly lower with groundnut cultivar '*Kadiri-6'* due to its better ground coverage. This cultivar has long statured growth habit with dense foliage which may have suppressed weed growth. The highest density and dry weight of all categories of weeds were associated with groundnut cultivar '*TAG-24,*' due to its short stature that would have resulted in lesser competitive ability allowing more number of weeds to establish. (Table 1). Among the unweeded check plots maintained separately for all the four varieties at recommended plant population of 0.33 m/ha (30 x 10 cm), the groundnut cultivar '*Kadiri-6'* recorded the lowest weed dry weight of 136 g/m^2 followed by '*Abhaya'*, '*Dharani'* and '*TAG-24'* with 225, 236 and 292 g/m^2, respectively.

The lowest density and dry weight of all the categories of weeds was obtained with the maintenance of plant population of 0.67 m/ha, which was comparable to 0.5 m/ha during early *Kharif*, irrespective of the varieties studied. This might be due to lack of sufficient solar light for germination of

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weed seeds at higher plant populations leading to reduced density and dry weight of the weeds. On the other hand, highest density and dry weight of weeds was obtained with the plant population of 0.33 k m/ ha because of the availability of adequate growth resources and solar light to weeds. The above results are similar with the findings of Senthil Kumar (2009).

Effect of varieties and plant populations on yield and economics

Among the varieties, dry matter production was significantly higher with '*Kadiri-6'* followed by '*Dharani'* and '*Abhaya'* due to better competitive ability of these varieties with weeds that would have suppressed weed growth more efficiently. The highest pod yield was obtained with variety '*Dharani*' which was significantly higher than rest of the varieties due to better partitioning efficiency of photosynthates to pods and weed smothering efficiency which led to increased number of filled pods/plant. The lowest pod yield was registered with '*Abhaya'* due to lower number of filled pods/plant compared to rest of the varieties. The highest haulm yield was obtained with '*Kadiri-6'* due to its long statured growth habit and dense foliage. These findings were in accordance with Soumya *et al.* (2013).

The highest pod yield was obtained with the plant population of 0.50 m/ha followed by 0.33 m/ha with a significant disparity between them. This might be due to maintenance of optimum plant population that led to reduced weed growth which in turn increased the filled pods/plant. The increase in pod yield with plant population of 0.50 m/ha was up to 14.0% as compared to 0.60 m/ha. The highest haulm yield was recorded with plant population of 0.67 m/ha due to maintenance of higher plants/unit area which in turn increased the production of higher dry matter production. The pod yield obtained in unweeded check plots recorded 815, 562, 408 and 313 kg/ha in '*Kadiri-6,' 'Abhaya,' 'Dharani'* and '*TAG-24,'* respectively. This clearly indicated that '*Kadiri-6'* recorded higher pod yield than rest of the varieties under unweeded conditions. This might be due to good weed smothering efficiency. The pod yield was significantly lower with '*TAG-24'* in unweeded check. This might be due to its short statured growth habit. The haulm yield in the unweeded check plots followed exactly similar trend with different magnitude as that of the pod yield. The highest benefit-cost ratio was obtained with '*Dharani'*, where as the lowest with '*Abhaya'* due to variation in pod yield. The highest benefit-cost ratio was obtained with plant population of 0.33 m/ha due to reduced seed cost and increased pod yield.

Thus**,** it was concluded that the highest weed suppressing ability was observed with '*Kadiri-6*' as compared to rest of the varieties, however, it recorded lower pod yield. The highestad yield was recorded with groundnut variety '*Dharani'*. The

Table 1. Density and dry matter of weeds, yield and benefit-cost ratio as influenced by varieties and plant populations during *Kharif* groundnut

Treatment	Weed density (no./m^2)				Weed dry weigh (g/m^2)				Dry matter production (t/ha)	Number of filled pods/plant	Pod yield (t/ha)	Haulm yield (t/ha)	Benefit-Cost ratio
	Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total					
Varieties													
'Abhaya'	3.34 (10.6)	4.42 (19.0)	3.46 (11.5)	6.45 (41.2)	1.80 (2.7)	2.31 (4.8)	1.86 (2.9)	3.31 (10.5)	7.57	17.8	1.99	5.27	2.07
'TAG-24'	4.69 (21.5)	6.65 (42.5)	4.51 (19.9)	9.18 (83.9)	2.49 (5.7)	3.42 (11.2)	2.40 (5.3)	4.75 (22.2)	7.46	26.8	2.86	3.82	2.96
'Dharani'	3.64 (12.7)	4.22 (17.3)	3.7 (13.2)	6.61 (43.2)	1.97 (3.4)	2.25 (4.6)	1.99 (3.5)	3.44 (11.4)	7.68	28.8	3.45	5.61	3.22
'Kadiri-6'	3.01 (8.6)	3.04 (8.7)	2.37 (5.1)	4.78 (22.4)	1.57 (2.0)	1.58 (2.0)	1.37 (1.4)	2.41 (5.3)	7.95	18.4	2.34	6.15	2.38
LSD (P=0.05)	0.465	0.54	0.464	0.496	0.224	0.260	0.214	0.263	0.07	1.20	0.08	0.297	0.081
Plant Population (m/ha)													
0.33 (30 x 10 cm)	4.08 (16.1)	5.86 (33.8)	4.38 (18.7)	8.31 (68.6)	2.11 (3.9)	2.96 (8.3)	2.24 (4.5)	4.14 (16.7)	5.90	27.8	2.75	4.37	3.11
0.44 (30 x 7.5 cm)	3.66 (12.9)	4.70 (21.6)	3.93 (14.9)	7.06 (49.4)	2.01 (3.5)	2.54 (5.9)	2.14 (4.1)	3.52 (11.9)	7.39	24.2	2.63	4.78	2.69
0.50 (20 x 10 cm)	3.63 (12.8)	4.06 (15.9)	3.04 (8.7)	6.15 (37.4)	1.90 (3.1)	2.10 (3.9)	1.68 (2.3)	3.13 (9.3)	7.81	21.6	2.83	5.44	2.75
0.67 (2 0x 7.5 cm)	3.23 (9.9)	3.64 (12.7)	2.69 (6.73)	5.46 (29.4)	1.81 (2.8)	1.97 (3.4)	1.55 (1.9)	2.92 (8.0)	9.54	18.4	2.43	6.26	2.09
LSD (P=0.05)	0.465	0.54	0.464	0.496	0.224	0.260	0.214	0.263	0.07	1.20	0.81	0.30	0.081

lowest weed density and dry weight were obtained with the maintenance of plant population of 0.66 m/ha while the highest pod yield was obtained with 0.50 m/ ha in early *Kharif*.

SUMMARY

Groundnut (*Arachis hypogaea* L.) is cultivated in diverse agro-climatic environments characterized by spatial and temporal variation in rainfall, temperature and soils of varying water holding capacity under rainfed as well as irrigated conditions. The productivity of early *Kharif* groundnut is very low due to lack of suitable variety and optimum plant population coupled with heavy weed infestation as the crop is grown under irrigation. Groundnut crop is highly sensitive to weed competition and yield reduction up to 70% have been observed (Americanos 1994). Varieties differ not only in their production potential, but also differ in competitive ability of weeds on account of variation in rapid development of foliage and formation of close canopy during early growth stage (Bussan *et al*. 1997). Different crop geometry also imparts competing ability of crop plants to weeds (Singh and Bhan 2002).

It was concluded that groundnut 'Kadin-6' had the highest weed suppressing ability, whereas the highest pod yield was recorded with variety *Dharani'*. A plant population of 0.66 m/ha was optimum for weed suppression.

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