

DRY MATTER ACCUMULATION AND UPTAKE OF N,P BY PEARLMILLET (*PENNISETUM GLAUCUM*) INTERCROPPING WITH GROUNDNUT IN RELATION TO FERTILIZER LEVELS UNDER DRYLAND CONDITIONS

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ABSTRACT

The experiment was conducted during *Kharif* 1991 and 1992. Pearlmillet+groundnut in 2:4 ratio recorded maximum drymatter production, but sole pearlmillet followed by pearlmillet+groundnut in 2:1 removed more NP. Application of 20 kg N+40kg P₂O₅/ha was superior to the rest of the fertilizer levels.

The productivity of rainfed crops like pearlmillet is too low. Intercropping with specific planting geometry with groundnut is a profitable practice under dryland conditions (Andrews, 1972). Drymatter is one of the governing factors which decides the yield of a crop and its accumulation depends upon the uptake of the nutrients specially nitrogen and phosphorus.

The experiment was conducted during *kharif* season of 1991 and 1992 at IARI New Delhi. Texturally the soil was sandy loam with a pH 7.1 (neutral), medium in available nitrogen (organic carbon 0.6%), phosphorus (23 kg P₂O₅/ha) and potassium (285 kg K₂O/ha). The cropping systems (sole groundnut-S₁; sole pearlmillet-S₂; pearlmillet + groundnut in 2:1-S₃; pearlmillet + groundnut in 1:2-S₄; pearlmillet + groundnut in 2:4-S₅) were allotted to main plots involving varieties MH-169 of pearlmillet and JL-24 of groundnut and fertilizer levels were allotted to sub plots (control-F₀; 20 kg N/ha-F₁; 40 kg N/ha-F₂; 20 kg N+40 kg P₂O₅/ha-F₃; 40 kg N+40 kg P₂O₅/ha-F₄). The sowings were done during 3rd and 2nd week of July 1991 and 1992 respectively at the uniform spacing of 35 cm x 10 cm forming a replacement series approach. Fertilizers were applied as per the treatments with urea and single super phosphate. The rainfall distribution was erratic in

1991 (457.54 mm) received in 42 days and in 1992 (528.6 mm) the distribution was more or less uniform. Pearlmillet took 73 and 75 days for maturity in 1991 and 1992, respectively.

Drymatter production by pearlmillet was significantly influenced by intercropping and fertilizer levels in both the years (Table-1). Pearlmillet+groundnut in 2:4 ratio recorded significantly maximum dry matter production compared to sole pearlmillet and pearlmillet+groundnut in 2:1 ratio in both the years but on par with 1:2 row ratio. Rao *et al.* (1990) reported the same results. Application of 20 kg N+40 kg P₂O₅/ha resulted in 17% and 8% increase in drymatter yield over control and 20 kg N/ha, respectively and the same trend is reflected in grain and stover yield of pearlmillet corroborating the results of Gautam *et al.* (1985) and Natarajan and Willey (1986). Application of higher dose of nitrogen alone and in combination with P could not result in higher yield this clearly indicated partial substitution for nitrogen due to legume component in a cereal+legume intercropping. However there is no significant interaction due to intercropping and fertilizer levels on drymatter production.

Uptake of nitrogen by grain was not significant due to intercropping and fertilizer levels but 'P' uptake by grain and stover was

Table 1. Drymatter accumulation and uptake of N, P by pearl millet at harvest as influenced Cropping System and Fertilizer Levels.

Cropping Systems	Drymatter accumulation per plant(Grams)				Uptake of Nitrogen (kg/ha)				Uptake of Phosphorus (kg/ha)				Yield (Q/ha)			
	1991		1992		1991		1992		1991		1992		1991		1992	
	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover	Grain
(Sole Pearl millet)	38.54	38.66	32.09	35.11	33.10	32.02	5.38	7.32	5.43	7.62	30.15	63.37	31.01	63.13		
(Pearl millet+Groundnut 2:1)	42.24	42.38	27.70	35.40	28.25	35.11	4.60	6.88	4.58	7.59	28.13	53.17	28.78	53.00		
(P.M. + G.N. 1:2)	43.28	43.42	21.12	31.00	23.50	30.73	3.37	5.74	3.62	6.19	23.96	38.93	25.09	38.93		
(P.M.+G.N. 2:4)	44.30	44.71	24.70	32.64	24.90	34.29	3.51	6.30	4.25	6.72	25.48	44.07	27.04	44.36		
S.E.M ±	0.42	0.49	0.82	2.46	1.11	2.55	0.28	0.49	0.21	0.24	0.63	0.78	1.13	0.76		
CD (0.05)	1.47	1.72	2.84	NS	3.84	NS	0.96	NS	0.72	0.83	2.19	2.71	4.45	2.61		
Fertilizers Levels (Control)	38.12	38.53	16.80	24.70	19.54	24.34	3.21	4.90	3.25	5.01	21.64	39.71	22.03	38.58		
(20 kg N/ha)	41.95	42.05	25.52	31.90	26.40	32.23	4.14	6.17	4.21	7.20	25.69	48.56	26.73	49.18		
(40 kg N/ha)	42.78	42.78	27.43	33.26	27.43	33.26	4.52	6.58	4.42	7.50	26.90	50.72	27.83	50.51		
(20 kg N+ 40 kg P ₂ O ₅ /ha)	43.85	45.45	31.55	38.41	37.80	38.75	4.90	7.40	5.61	8.31	30.01	54.78	31.28	55.04		
(40 kg N+40 kg P ₂ O ₅ /ha)	43.75	43.85	31.52	39.43	37.54	39.09	4.69	7.40	4.86	8.42	30.41	55.66	31.65	55.97		
S.E.M ±	1.09	1.13	2.05	5.72	2.46	4.69	0.16	0.24	0.23	0.52	1.32	1.79	1.57	2.01		
CD (0.05) *	3.15	3.26	5.91	NS	7.10	NS	0.48	0.69	0.66	1.50	3.83	5.17	4.53	5.80		

NS=Non-Significant

Treatment S₁ (Groundnut pure stand) is not mentioned as the data pertaining to pearl millet crop only.

significant in both the years. There is no significant interaction for the uptake of NP by pearl millet in both years. Sole pearl millet absorbed more 'P' than intercropping and the treatment pearl millet+groundnut in 2:4 ratio removed as much as 'P' as in 2:1 ratio and the same trend is observed in grain yield. Nanwal (1991) noticed the differed absorption of N and P due to intercropping of pearl millet with legumes. Among the fertilizer levels 20 kg N + 40 kg P₂O₅/ha recorded maximum uptake of NP which differed significantly from control and 20 kg N/ha. Application of 40 kg N/ha and 40 kg N+40 Kg P₂O₅/ha proved inferior to 20 kg

N+40 Kg P₂O₅/ha and recorded more grain yield in both years. This clearly indicates the complementary effect of a legume crop intercropped with a cereal crop.

Nanwal (1991) and Taneja *et al.* (1981) also reported the importance of N and P in pearl millet intercropping system. Therefore it is advisable to adopt intercropping of pearl millet+groundnut in 2:4 row ratio (S₂) along with application of 20 kg N+40 kg P₂O₅/ha (F₃). Sole pearl millet grain yield though higher than S₅ due to more plant population, the additional yield of groundnut as a intercrop in pearl millet will insure diverse requirement of the farmers.

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