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Growth and dry matter production of semidry rice under varied doses and time of nitrogen application

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Abstract
An experiment was conducted during *kharif* season of 2017 on clay loam soils of Agricultural Research Institute, PJTSAU, Rajendranagar with an aim to find out the optimum dose and time of nitrogen application for semi-dry rice. Observations were recorded at 20 day interval from sowing *viz.*, 20, 40 60 and 80 DAS and at harvest. At all the times of sampling growth parameters like seedling vigour index, plant height, number of tillers m^{-2}, dry matter production, leaf area index were recorded to be highest with application of 160 kg N ha^{-1} 25% each at sowing, 20 DAS, 40 DAS and 60 DAS compared to the other treatments. However, growth recorded with 160 kg in four equal splits was found to be on par with the growth in the treatments having 160 and 140 kg N ha^{-1} applied at various splits and with application of 120 kg N ha^{-1} N in 4 equal splits at sowing, 20, 40 and 60 DAS. Observations on growth parameters were found to be the lowest with application with of nitrogen at 120 kg ha^{-1} N in 3 splits with 12% at sowing, 44% at 40 DAS and 44% at 60 DAS (farmer's practice).

Keywords: Rice, semi-dry system, time and dose of nitrogen application

Introduction

The total area of rice in world is 163.3 m ha with production of 749.7 mt (FAO 2016) [5]. The total area of rice in India is 44.50 m ha, with a production and productivity of 108.8 mt and 2.38 t ha-1 respectively (Directorate of Economics and Statistics, 2015-16). Telangana State contributes to 2.09 m ha area with a production of 6.62 mt, at an average productivity of 3295 kg ha-1 (Season and Crop report Telangana, 2016-17). Semi dry system, is a method of cultivation of rice wherein seeds are sown in ploughed dry soil with monsoon rains same as aerobic rice and when the monsoon become active the field is impounded in with rainwater or canal water of a project or bore water and continued as wet land crop. It is most common in the project areas where the release of project water is not in time there by transplantation is not being done well in time. They cut down the initial water consumption 30% by avoiding rising of seedlings in nursery, puddling, and transplanting under puddled soil. Semi dry system reduces the cost of cultivation by omitting the preparatory operation like puddling, levelling, bund formation and transplantation. It constitutes of 17.53 m ha area with 36.48% production in our country. In view fast development of irrigation facilities this system is likely to gain lot of importance in the state of Telangana. There is every need to develop complete production technology for semi dry system in project ayacut areas and bore well irrigated system having sufficient water. Fertilizer is the most important factor deciding the growth and productivity of rice. Among different nutrients nitrogen (N) is the most limiting nutrient for rice production and is required more consistently and in larger amounts than other nutrients. Hence an attempt was made in this study to find out the optimum dose and time of nitrogen application to rice under semi-dry system.

Material and methods

The study was conducted with ten treatments and laid out in randomized block design with three replications. The treatments comprised of three doses of nitrogen (120, 140 and 160 kg ha-1) and three schedules of nitrogen application (25% each at sowing, 20 DAS, 40 DAS and 60 DAS, 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30 at 60 DAS,10% at sowing, 10% at 20 DAS, 40% at 40DAS and 40% at 60 DAS.) and were evaluated against the farmers practice (120 kg ha-1 N at 3 splits with 12% at sowing, 44% at 40 DAS and 44% at 60 DAS). The soil of the experimental site was clay loam in texture, slightly alkaline in reaction, non saline, low in organic carbon and available nitrogen, high in available phosphorous and potassium. The crop was sown in non puddle field by giving one pre sowing irrigation and grown as irrigated dry crop up to 40 DAS and there after converted to wet and 2-5 cm standing water was maintained up to the harvesting stage of the crop. Conversion to wet at 40 DAS done with an assumption that canal water will be available by that time for cultivation of rice. The water was withdrawn 10 days before harvesting. In this study a short duration (120 days) variety JGL-18047 (Bathukamma) was used. Different doses nitrogen (120, 140 and 160 kg ha-1), in the form of urea was applied in accordance to treatment specification in the four splits. Phosphorous @ 60 kg ha-1 in the form of SSP and potassium @40 kg ha-1 in the form of MOP were applied at the time of sowing as basal. The growth of the crop expressed as seedling vigour index, plant height, tiller production, leaf area index and dry matter accumulation of semidry rice at different stages as influenced by dose and time of application of nitrogen is presented this paper.

Results and discussion Seedling vigour

Seedling vigour is the ability of plant to emerge rapidly from soil or water. It helps in better plant establishment and successful competition with weeds in all phases of seedling development from seed germination through to stand establishment. Seedling vigour was expressed as seedling vigour index (SVI). It was recorded at 15 DAS, 30 DAS, and 45 DAS in semidry rice (Table 1) by recording the shoot length, root length and germination percentage. The average of the shoot length and root length were worked out and SVI was worked out using the following formula

$$\text{SVI} = \frac{\text{Seedling length (root+ shoot)} \times \text{Germination percentage}}{100}$$

At 15 DAS, highest seedling vigour index (27.19) was recorded with application of nitrogen @ 160 kg ha-1 in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS compared to the other treatments. However the seedling vigour recorded in various treatments with 120 kg N ha-1 (T1 to T4) and 140 kg N ha-1 (T5 to T7) were found to be on par with higher doses of N (160 kg ha-1). This might be due to the fact under direct seeded rice, initial growth is very slow and root system is not well developed and plants fail to absorb the applied nitrogen, thus relatively higher losses through leaching/ denitrification are expected (Thind*et al*. 2018) [10]. At 30 and 45 DAS, the same T8 treatment (application of 160 kg N ha-1 in 4 equal splits of 25% each in 4 equal splits at sowing, 20, 40 and 60 DAS) continued to register the highest seedling vigour index (42.72 and 56.13 respectively) compared to the other treatments.

However, this was found to be on par with the other lower doses of nitrogen *viz*., 120 and 140 kg N ha-1 when they were applied in four equal splits of 25% each at sowing, 20, 40 and 60 DAS (T2 and T5). Lowest seedling vigour index (34.20 and 46.32 respectively) was noticed in the farmer's practice treatment (T1- application of nitrogen at 120 kg ha-1 N in 3 splits with 12% at sowing, 44% at 40 DAS and 44% at 60 DAS) and was significantly lower than all the doses (120, 140 and 160 kg N ha-1) when applied as 25% each in 4 equal splits of at sowing, 20, 40 and 60 DAS (T2, T5, and T8) and all the doses (140 and 160 kg N ha-1) when applied as 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS. Application of higher doses of nitrogen enhanced the growth of meristamatic and vegetative tissues and in turn influenced both the shoot length and root length. Application of nitrogen in equal split doses increased the shoot and root growth significantly due to availability of sufficient quantities throughout the crop growth stages when compared to the other unequal split applications of nitrogen.

Table 1: Seedling vigour of semi dry rice as influenced by dose and time of nitrogen application

Trt.	Treatments	Seedling vigour									
		15 DAS				30 DAS			45 DAS		
		Germination (%)	Shoot growth	Root growth	SVI	Shoot growth	Root growth	SVI	Shoot growth	Root growth	SVI
T1	Farmer's practice (120 kg ha-1 N in 3 splits of 12% at sowing, 44% at 40 DAS and 44% at 60 DAS)	90	18.51	7.56	23.46	25.40	13.21	34.75	32.51	18.96	46.32
T2	120 kg ha-1 N in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS	90	19.21	10.26	26.52	28.82	15.40	39.80	36.83	21.71	52.69
T3	120 kg ha-1 N in 4 splits of 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS.	90	18.2	7.06	22.73	26.81	15.41	36.93	34.50	20.46	49.47
T4	120 kg ha-1 N in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS	90	18.91	8.06	24.27	27.30	15.33	38.37	35.81	21.00	51.13
T5	140 kg ha-1 N in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS	90	21.50	8.21	26.76	29.72	16.11	41.25	38.63	22.13	54.69
T6	140 kg ha-1 N in 4 splits of 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS	90	18.30	7.32	23.06	27.10	14.42	37.37	35.95	20.43	50.75
T7	140 kg ha-1 N in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS	90	19.82	9.01	25.95	28.2	15.38	39.06	36.20	20.56	51.09
T8	160 kg ha-1 N in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS	90	21.90	8.31	27.19	31.33	16.13	42.72	40.12	22.25	56.14
T9	160 kg ha-1 N in 4 splits of 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS	90	18.52	8.19	24.04	27.50	14.70	37.98	36.23	20.90	51.42
T10	160 kg ha-1 N in 4 splits of 20% at sowing, 20 at 20 DAS, 30% at 40 DAS and 30% at 60 DAS	90	20.84	8.95	26.81	30.52	15.92	41.80	39.11	21.32	54.39
	SE(m) ±				1.18			1.43			1.76
	CD (p=0.05)				NS			4.30			5.28
	CV (%)				8.2			6.4			6.6

Plant height (cm)

Plant height is an important agronomic trait that directly affects the yield of rice crop. They are directly associated with the vegetative growth and dry matter production. If Plants are too short; it will lead to insufficient growth and ultimately affect the yield potential of rice. They are governed by many factors such as light space, water and nutrients. In this study plant height was recorded at 20 DAS, 40 DAS, 60 DAS, 80 DAS and harvest in this study and presented in table 2. Plant height increased progressively from the seedling to the panicle initiation, there after the growth was slow and increase in height was less. Among the different doses of nitrogen the highest plant height was recorded with 160 kg N ha-1 compared to the other two doses (120 and 140 kg N ha-1) of nitrogen at all crop growth stages/ days after sowing, but it was found to be influenced by the time and quantity of fertilizer applied in splits. With regard to time of application of N, the highest plant height was noticed in all the growth stages in treatments with application of N in 4 equal splits at sowing, 20, 40 and 60 DAS than the other splits and application of 120 kg N ha-1 was found to be equally effective in promoting the crop growth as that of higher doses, as sufficient quantities of nitrogen was available for the plant from the seedling stage. This might be due to the fact that nitrogen is directly associated with plant metabolism and vegetative growth. Application of excess nitrogen to the plant results in increased vegetative growth due to meristamatic growth, cell division and cell elongation (Rani, 2012 and Amrutha, 2014) [9, 2]. The results collaborate with findings of Bai *et al*. (2014) [3] and Hebbal (2015) [6]. Lowest plant height at all the growth stages was observed in farmer's practice.

Tiller production

Tillering ability is one of the most important traits of rice, since it can have a significant influence on the future production of panicles and as a consequence affects on grain yield (Miller *et al*., 1991) [8]. They also contributes to the dry matter production there by the straw yield will increase significantly. Tiller production (number of tillers m-2) was recorded at 20 DAS, 40 DAS, 60 DAS, 80 DAS and harvest (Table 2). At 20 DAS the tillers production was not initiated. Hence all the treatments irrespective of dose and time of application of nitrogen found were to be on par. At 40, 60 and 80 DAS, application of nitrogen @ 160 kg ha-1 in 4 equal splits i.e., at sowing, 20, 40 and 60 DAS had recorded the highest tillers m-2 (344, 424 and 459 respectively) which were found to be on par with the treatments having 160 and 140 kg N ha-1 applied at various splits and T2 (application of 120 kg N ha-1 N in 4 equal splits at sowing, 20, 40 and 60 DAS). Lowest tillers m-2 was noticed in the farmer's practice (260, 320 and 348) which was significantly inferior with the all the different splits application of the 140 and 160 kg N ha 1 and T2- application of nitrogen @ 120 kg ha-1 in 4 equal splits i.e., at sowing, 20, 40 and 60 DAS.

At harvest number of tillers m-2 was reduced compared to the previous growth stages due to the decaying of unproductive tillers from the plots. However, treatment T8- application of nitrogen @ 160 kg ha-1 in 4 equal splits i.e., at sowing, 20, 40 and 60 DAS was found to record the highest tillers m-2 (381) compared to the other treatments which was found to be on par with the treatments having 160 and 140 kg N ha-1 applied at various splits and T2 (application of 120 kg N ha-1 N in 4 equal splits at sowing, 20, 40 and 60 DAS). Lowest number of tillers m-2 was noticed in the farmer's practices (287) which was significantly inferior with the all the different splits application of the 140 and 160 kg N ha-1 and T2- application of nitrogen @ 120 kg ha-1 in 4 equal splits i.e., at sowing, 20, 40 and 60 DAS and on par with T3 (120 kg N ha-1 with 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS) and T4 (120 kg N ha-1 in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS). The results corroborate with results of Hebbal (2015) [6] and Bai *et al*. (2014) [3].

Table 2: Leaf area index and Dry matter production of semi dry rice as influenced by dose and time of nitrogen application

Trt. No	Treatment	Plant height (cm)					Number of tillers m-2				
		20 DAS	40 DAS	60 DAS	80 DAS	Harvest	20 DAS	40 DAS	60 DAS	80 DAS	Harvest
T1	Farmer's practice (120 kg ha-1 N in 3 splits of 12% at sowing, 44% at 40 DAS and 44% at 60 DAS)	19.6	29.9	47.9	66.4	69.2	121.3	260.0	320.0	348.0	286.6
T2	120 kg ha-1 N in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS	20.6	34.1	56.3	76.9	79.4	124.0	308.7	375.3	416.0	350.6
T3	120 kg ha-1 N in 4 splits of 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS.	19.4	30.5	52.9	72.7	75.4	122.7	276.0	340.0	366.6	313.3
T4	120 kg ha-1 N in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS	20.2	32.3	53.8	74.3	76	128.7	298.6	356.0	393.3	330.6
T5	140 kg ha-1 N in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS	22.2	35.6	58.5	80.0	83.2	132.0	329.3	400.6	442.6	358.6
T6	140 kg ha-1 N in 4 splits of 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS	19.5	32.5	55.4	75.7	78.3	126.6	286.6	372.3	412.6	337.3
T7	140 kg ha-1 N in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS	21.0	34.1	57.3	77.2	80.2	129.3	305.3	380.0	425.3	344.7
T8	160 kg ha-1 N in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS	22.9	36.4	61.5	83.1	84.9	128.0	344.0	424.0	458.6	381.3
T9	160 kg ha-1 N in 4 splits of 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS	20.0	33.0	59.6	78.2	82.0	129.3	294.6	396.0	428.0	344.0
T10	160 kg ha-1 N in 4 splits of 20% at sowing, 20 at 20 DAS, 30% at 40 DAS and 30% at 60 DAS	22.1	35.1	60.0	81.1	83.5	130.6	333.3	410.0	437.3	362.0
	SE(m) ±	0.8	1.4	2.4	2.9	2.9	5.7	13.7	18.1	18.1	15.9
	CD (p=0.05)	NS	4.0	7.2	8.7	8.7	NS	41.1	54.3	54	47.4
	CV (%)	6.8	7.0	7.4	6.5	6.4	7.7	7.8	8.3	7.5	8.1

Leaf Area Index (LAI)

Leaf area index is an important trait that is related to canopy photosynthetic rate and dry matter production during crop growth period. An evaluation of LAI may enable us to quantify the growth and explore the factors that limit the dry matter production (Hirooka*et al*. 2017) [7]. It provides information on crop growth dynamics and is highly correlated with crop biomass and productivity (Venkateswarlu*et al*. 1976) [11]. In this study leaf area index was estimated at 20 DAS, 40 DAS, 60 DAS, 80 DAS and harvest (Table 3). The green leaves were detached from the stem and area was measured by automatic leaf area meter. The total leaf area of the sample was estimated by following formula.

$$LAI = \frac{\text{Leaf area}}{\text{Unit ground area}}$$

At 20 DAS, highest leaf area index (0.44) was recorded with application of nitrogen @ 160 kg ha-1 in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS (T8) compared to the other treatments. However, this was found to be on par with the other lower doses of nitrogen *viz*., 120 and 140 kg N ha-1 applied in different splits. Lowest leaf area index was observed in the T3 - application of 120 kg N ha-1 in 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS was shown on par with other doses and time of application of nitrogen in various splits.

At 40 DAS, same treatment (T8 - application of nitrogen @ 160 kg ha-1 in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS) had continued to show the highest leaf area index (1.85) which was found to be on par with all the higher doses all the doses 140 and 160 kg N ha-1) of fertilizers applied in different splits, T2- application of nitrogen @ 120 kg ha-1 in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS and T4-120 kg N ha-1 in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS. Farmer's practice (T1- application of nitrogen at 120 kg ha-1 N in 3 splits with 12% at sowing, 44% at 40 DAS and 44% at 60 DAS) recorded the lowest LAI (1.43) compared to the other treatments. However it was found to be significantly inferior to all the doses (120, 140 and 160 kg N ha-1) when applied 25% each in 4 equal splits of at sowing, 20, 40 and 60 DAS (T2, T5, and T8), all the doses (120, 140 and 160 kg N ha-1) applied as 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS(T4, T7 and T10) and T9 - application of 160 kg N ha-1 in 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS.

At 60 DAS, 80 DAS and harvest also application of nitrogen @ 160 kg ha-1 in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS (T8) continued to register the highest leaf area index (3.84, 3.63 and 1.75). The trend was similar to that of 40 DAS and farmer's practice (T1) continued to show the lowest leaf area index (2.99, 2.85 and 1.30). Similar results were found by Amrutha (2014) [2] and Hebbal (2015) [6] in aerobic rice.

Table 3: Leaf area index and Dry matter production of semi dry rice as influenced by dose and time of nitrogen application

Trt. No	Treatment	Leaf Area Index (LAI)					Dry matter production (kg ha-1)				
		20 DAS	40 DAS	60 DAS	80 DAS	Harvest	20 DAS	40 DAS	60 DAS	80 DAS	Harvest
T1	Farmer's practice (120 kg ha-1 N in 3 splits of 12% at sowing, 44% at 40 DAS and 44% at 60 DAS)	0.38	.43	2.99	2.85	1.30	84	1337	3782	6535	8720
T2	120 kg ha-1 N in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS	0.41	1.75	3.55	3.34	1.57	325	1599	4380	7422	9918
T3	120 kg ha-1 N in 4 splits of 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS.	0.38	1.50	3.09	3.04	1.33	277	1409	4066	6873	9272
T4	120 kg ha-1 N in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS	0.39	1.69	3.23	3.19	1.45	313	1507	4227	7162	9393
T5	140 kg ha-1 N in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS	0.42	1.80	3.71	3.43	1.68	333	1660	4570	7624	10401
T6	140 kg ha-1 N in 4 splits of 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS	0.39	1.65	3.37	3.27	1.55	280	1460	4382	7341	10130
T7	140 kg ha-1 N in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS	0.41	1.73	3.54	3.32	1.56	317	1558	4499	7466	10236
T8	160 kg ha-1 N in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS	0.44	1.85	3.84	3.63	1.75	348	1772	4818	7984	10725
T9	160 kg ha-1 N in 4 splits of 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS	0.40	1.68	3.53	3.37	1.59	307	1474	4568	7794	10318
T10	160 kg ha-1 N in 4 splits of 20% at sowing, 20 at 20 DAS, 30% at 40 DAS and 30% at 60 DAS	0.41	1.79	3.66	3.49	1.64	327	1635	4673	7870	10574
	SE(m) ±	0.03	0.08	0.14	0.13	0.08	22.7	75.6	186.0	262.6	398.1
	CD (p=0.05)	NS	0.23	0.41	0.40	0.23	NS	226.4	557.0	780.2	1189.8
	CV (%)	9.50	7.93	6.77	7.03	8.63	12.6	8.5	7.3	6.1	7.0

Dry matter production (kg ha-1)

Photosynthesis is the foundation of dry matter production in plants. In rice, 90% of grain yield originates from the photosynthetic production of leaves after heading, especially from flag leaf. Production of adequate quantity of dry matter is essential for higher grain yield. Positive significant correlation was reported in dry matter production with grain yield. Dry matter production is also an important plant growth parameter in defining grain harvest index which is a ratio of grain yield to total biological yield (Fageria, 2004) [4]. Dry matter accumulation by semi dry rice at 20 DAS, 40 DAS, 60 DAS, 80 DAS and harvest is presented in table 3.

At 20 DAS, highest dry matter (348 kg ha-1) was recorded with application of nitrogen @ 160 kg ha-1 in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS compared to the other treatments. However, this was found to be on par with the other lower doses of nitrogen *viz*., 120 and 140 kg N ha-1applied at various splits. Lowest dry matter (277 kg ha-1) was produced in the treatment (T3- application of 120 kg N ha-1 with 10% at sowing, 10% at 20 DAS, 40% at 40 DAS and 40% at 60 DAS). They were found to be on par with all the doses and split application of 140 and 160 kg N ha-1.

At 40 DAS, similar trend continued with treatment T8 (160 kg N ha-1 in 4 equal splits) being the highest in dry matter production (1772 kg ha-1) compared to the other treatments. It was found to be on par with application of different doses of 120 and 140 kg N ha-1 when they were applied in four equal splits of 25% each at sowing, 20, 40 and 60 DAS (T2 and T5) and other treatments like T10-160 kg N ha-1 in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS and T7-140 kg N ha-1 in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS. Farmer's practice recorded the lowest dry matter production (1337 kg ha-1) and was significantly inferior than the all the doses (120, 140 and 160 kg N ha-1) when applied 25% each in 4 equal splits of at sowing, 20, 40 and 60 DAS (T2, T5, and T8) and T10 -160 kg N ha-1 in 4 splits of 20% at sowing, 20% at 20 DAS, 30% at 40 DAS and 30% at 60 DAS.

At 60 DAS, 80 DAS and at harvest also application of nitrogen @ 160 kg ha-1 in 4 equal splits i.e., at sowing, 20, 40 and 60 DAS continued to show the highest dry matter production of 4818 kg ha-1, 7984 kg ha-1 and 10725 kg ha-1 respectively which was on par with the treatments having 160 and 140 kg N ha-1 applied at various splits and T2 (application of 120 kg N ha-1 N in 4 equal splits at sowing, 20, 40 and 60 DAS). Lowest dry matter (3782 kg ha-1, 6535 kg ha-1 and 8720 kg ha-1) was registered in farmer's practice at 60 DAS, 80 DAS and at harvest respectively which was significantly inferior to the treatments with 140 and 160 kg N ha-1 and application of 120 kg N ha-1 in 4 equal splits at sowing, 20, 40 and 60 DAS. Similar results were found by Hebbal (2015) [6] in aerobic rice and Bai *et a*l. (2014) [3] in semi dry rice.

Conclusion

Application 120 kg nitrogen in 4 equal splits of 25% each at sowing, 20, 40 and 60 DAS was found to be the most appropriate dose and time of application for semidry rice on clay loams of Telangana.

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