

EFFECT OF SEQUENTIAL INTERCROPPING SYSTEMS AND INTEGRATED NUTRIENT MANAGEMENT ON NUTRIENT UPTAKE OF PIGEONPEA

ABSTRACT

An experiment was carried out during *kharif* and *rabi* seasons of 2019-20 and 2020-21 at ARI, Rajendranagar, Hyderabad. The experiment was laid out in randomized block design (Factorial) with two factors *i.e.*, one with six levels of sequential intercropping systems of pigeonpea (S_1 to S_6) and other with two levels of nutrient management practices (N_1 and N_2 - an integrated approach). Nutrient uptake *viz.*, nitrogen, phosphorous and potassium uptakes of pigeonpea crop (grain, stalk and total) was found by using dry matter production and respective nutrient contents at harvesting stage. Sole pigeonpea (S_1) recorded significantly higher mean grain, stalk and total nitrogen, phosphorous and potassium uptake as compared to all other sequential intercropping systems (S_3 , S_4 , S_5 and S_6) and was statistically at par with S_2 . The minimum mean grain, stalk and total nitrogen, phosphorous and potassium uptake was recorded in treatments with sequential intercropping in paired row pigeonpea + sweet corn – safflower (S_6) and paired row pigeonpea + sweet corn – chickpea (S_5) and they were on par with each other.

INTRODUCTION

Pigeonpea (*Cajanus cajan* (L.) Millsp., syn. *Cajanus indicus* Spreng), also known as arhar, tur, pigeonpea, congo-pea, no eye pea is the most important *kharif* season crop in India and second most important pulse crop after chickpea. The production of pigeonpea has increased over the years, from 1.72 million tonnes in 1950-51 to 4.25 million tonnes in 2017-18. The increase in production is a result of increase in area from 2.18 million hectares in 1950-51 to around 5.34 million hectares in 2016-17. However, the overall productivity of pigeonpea has remained between 637 to 655 kg ha⁻¹ for last several decades (India Stat, 2019). The low yield of pigeonpea is not only due to its cultivation on sub-marginal lands, but also because of inadequate and imbalanced fertilization which decreased the productivity. In spite of its importance in small hold economy, the crop has not received proper attention for possible yield improvement through management practices.

Intercropping of short duration crops in the inter space between two rows of a wide spaced crop like pigeonpea that initially grows slowly, can help in better resource utilization and stabilize crop productivity by reducing impact of weather vagaries and increase the cropping intensity (Marer *et al.*, 2007).

Pigeonpea during *kharif* is generally sown in the month of June - July and it is harvested in the month of December-January. The intercrops sown in *kharif* season like sweetcorn can be harvested in 80-85 days. Many Indian farmers after harvesting of intercrops of pigeonpea, keep the land vacant in between the rows of pigeonpea till the harvesting of pigeonpea. So, there is need to utilise that land for crop production by sowing again with some suitable crops. There is possibility of growing short duration and fast growing crops in between the rows of

pigeonpea after the harvesting of *kharif* sown inter crops. This practice of sequential crops for *kharif* inter crops which are sequential inter cropping for pigeonpea is till now not noticed. Nutrient management is the basic factor and is found to exert a great influence not only on growth and yield attributes of crops but also for obtaining sustained productivity. Among all nutrients N, P, K are most important nutrients which contribute to proper growth and yield of crop plant and it also has direct effect on metabolism of plant. In intercropping system, intercrop has lower plant population than its sole crop thus higher dose of nutrients may be helpful in improving yield (Kumar and Kushwaha, 2018). Hence, present study was undertaken to see the feasibility of pigeonpea with intercropping of *kharif* and *rabi* season crops in order to make efficient utilization of natural resources under proper agronomic management for higher productivity of crops by limiting competition among the crops. So, it will be beneficial to the farmers by utilizing the land effectively with optimum inputs and harnessing higher income.

MATERIALS AND METHODS

An experiment carried out during *kharif* and *rabi* seasons of 2019-20 and 2020-21 at ARI, Rajendranagar, Hyderabad is located in the Southern agroclimatic zone of Telangana state. Geographically, it lies at 17° 19' 24" N latitude and 78° 23' 50" E longitude at an altitude of 523 m above mean sea level. During the crop growth period, a total rainfall of 708.8 mm received in 47 rainy days during 2019-20 and 1281.8 mm in 57 days during 2020-21. The daily mean bright sunshine during crop growth period ranged from 1.2 to 10.3 hours with an average of 6.1 hours in 2019-20 season while in 2020-21 season it was ranged from 0.6 to 9.4 hours with an average of 6.0 hours. The daily mean evaporation (mm) during the crop growth period was 3.6 mm during both 2019-20 and 2020-21 seasons.

The soil was clay in texture, slightly alkaline, low in organic carbon and available nitrogen, medium in available phosphorous and high in available potassium. Pigeonpea variety, TDRG 4 (Hanuma), sweet corn (Sugar-75), chickpea (NBeG 3) and safflower (Manjeera) were tested in this experiment.

The experiment was laid out in Randomized Block design (Factorial) with six sequential intercropping systems [S₁ - Pigeonpea (180 cm), S₂ - Paired row pigeonpea (60-300-60 cm) (With in pair 60 cm and in between pair 300 cm), S₃ - Pigeonpea + Sweetcorn – Chickpea, S₄ - Pigeonpea + Sweetcorn – Safflower, S₅ - Paired row pigeonpea + Sweetcorn – Chickpea and S₆ - Paired row pigeonpea + Sweetcorn – Safflower] and two nutrient management practices [N₁ - 100 % RDN and N₂ - 75 % RDN + 25 % N through FYM – an integrated approach] with three replications. For *kharif* season sown pigeonpea and sweetcorn above mentioned INM treatments (N₁ and N₂) were applied based on plant population. For sequential intercrops, sown in *rabi* season only 75 % Recommended Dose of Nitrogen through fertilizers (RDN) on population basis was applied through straight fertilizers. Irrespective of treatments P and K were applied based on recommended dose on population

basis. Plant samples of pigeonpea were collected for dry matter production at harvesting stage used for chemical analysis. The oven dried plant samples were ground in a willey mill and finely ground samples were kept in labeled butter paper bags. Samples were analyzed for N, P and K content by adapting standard procedures (Piper, 1966). The values of NPK contents for grain and straw were recorded treatment wise and then N, P and K uptakes were determined for grain and straw yields of each treatments.

List 1: Method employed for plant analysis:

Nutrient content in sample	Method employed
Total Nitrogen	Modified Kjeldhal's method (Jackson, 1967)
Total Phosphorus	Di-acid digestion method and colorimetric estimation (Piper, 1966)
Total Potassium	Di-acid digestion method followed by Flame photometer method (Jackson, 1967)

RESULTS AND DISCUSSION

Nitrogen uptake

The mean grain, stalk and total (grain + stalk) nitrogen uptake was 12.88, 63.39 and 76.44 kg ha⁻¹, respectively. The nitrogen uptake in grain, stalk and total (grain + stalk) as influenced by sequential intercropping systems and integrated nutrient management practices during 2019-20 and 2020-21 were analysed statistically and presented in Table 1.

The data presented in the Table 1 revealed that, the mean grain, stalk and total (grain + stalk) nitrogen uptake was significantly influenced by the sequential intercropping systems during both the years of study. Sole pigeonpea (S₁) recorded significantly higher mean grain, stalk and total nitrogen uptake (16.47, 76.58 and 93.44 kg ha⁻¹, respectively) as compared to all other sequential inter cropping systems (S₃, S₄, S₅ and S₆) and was statistically at par with S₂ (15.01, 71.84 and 86.98 kg ha⁻¹, respectively). The minimum mean grain, stalk and total nitrogen uptake was recorded in treatments with sequential intercropping in paired row pigeonpea + sweet corn – safflower (S₆) (10.31, 53.65 and 64.30 kg ha⁻¹, respectively) and paired row pigeonpea + sweet corn – chickpea (S₅) (10.47, 56.16 and 66.63 kg ha⁻¹, respectively) and they were on par with each other. Nutrient uptake is the function of dry matter production and concentration of that nutrient (Singh, 2017). Likewise, may be due to higher dry matter production and concentration of nitrogen of pigeonpea sown as sole (S₁ and S₂) than pigeonpea with sequential inter cropping systems (S₃, S₄, S₅ and S₆).

Higher mean grain, stalk and total nitrogen uptake was recorded with sequential intercropping in pigeonpea with sweet corn – chickpea (S₃) (12.60, 62.08 and 74.80 kg ha⁻¹, respectively) and pigeonpea with sweet corn – safflower (S₄) (12.45, 60.05 and 72.51 kg ha⁻¹, respectively) than sequential intercropping in paired row pigeonpea with sweet corn – chickpea (S₅) (10.47, 56.16 and 66.63 kg ha⁻¹, respectively) and paired row pigeonpea with sweet corn – safflower (S₆) (10.31, 53.65 and 64.30 kg ha⁻¹, respectively). Results were in line with the findings of Patil and Padmani (2007).

Mean grain, stalk and total nitrogen uptake of pigeonpea was shown statistically significant difference between nutrient management practices *i.e.*, 100 % RDN through fertilizers (N₁) and 75 % RDN through fertilizers + 25 % RDN through FYM (N₂) – an integrated approach, during both the years (2019-20 and 2020-21). The maximum harvest index was recorded in treatments in which application of 75 % RDN through fertilizers + 25 % RDN through FYM (N₂) (14.60, 68.33 and 83.08 kg ha⁻¹, respectively) over 100 % RDN through fertilizers (N₁) (11.17, 58.46 and 69.80 kg ha⁻¹, respectively). This might be due to integrated application of organic and inorganic nutrient form that resulted higher availability of nitrogen in soil. Along with that higher dry matter production and concentration of nitrogen in N₂ lead to higher nitrogen uptake. Similar results were also observed with Kumawat *et al.* (2015).

Phosphorous uptake

The mean grain, straw and total (grain + stalk) phosphorous uptake was 8.64, 7.40 and 16.03 kg ha⁻¹, respectively. The phosphorous uptake in grain, stalk and total (grain + stalk) as influenced by sequential intercropping systems and integrated nutrient management practices during 2019-20 and 2020-21 were analysed statistically and presented in Table 2.

The data presented in the Table 2 revealed that, mean grain, stalk and total (grain + stalk) phosphorous uptake was significantly influenced by the sequential intercropping systems during both the years of study. Sole pigeonpea (S₁) recorded significantly higher mean grain, stalk and total phosphorous uptake (10.69, 8.60 and 19.29 kg ha⁻¹, respectively) as compared to all other sequential inter cropping systems (S₃, S₄, S₅ and S₆) and was statistically at par with S₂ (10.00, 9.16 and 19.17 kg ha⁻¹, respectively). The minimum mean grain, stalk and total phosphorous uptake was recorded in treatments with sequential intercropping in paired row pigeonpea + sweet corn – safflower (S₆) (6.75, 6.12 and 12.88 kg ha⁻¹, respectively) which is on par with the sequential intercropping in paired row pigeonpea + sweet corn – chickpea (S₅) (7.07, 6.18 and 13.25 kg ha⁻¹, respectively). The higher mean grain, stalk and total phosphorous uptake of sole pigeonpea (S₁ and S₂) than pigeonpea with sequential inter cropping systems (S₃, S₄, S₅ and S₆) may be due to higher dry matter production and concentration of phosphorous in grain and whole plant.

Higher mean grain, stalk and total phosphorous uptake was recorded with sequential intercropping in pigeonpea with sweet corn – chickpea (S₃) (9.02, 7.08 and 16.09 kg ha⁻¹, respectively) and pigeonpea with sweet corn – safflower (S₄) (8.28, 7.25 and 15.53 kg ha⁻¹, respectively) than sequential intercropping in paired row pigeonpea with sweet corn – chickpea (S₅) (7.07, 6.18 and 13.25 kg ha⁻¹, respectively) and paired row pigeonpea + sweet corn – safflower (S₆) (6.75, 6.12 and 12.88 kg ha⁻¹, respectively) during 2019-20 and 2020-21, respectively. These results were similar with the findings of Patil and Padmani (2007).

Mean grain, stalk and total phosphorous uptake of pigeonpea was shown statistically significant difference between nutrient management practices *i.e.*, 100 % RDN through fertilizers (N₁) and 75 % RDN through fertilizers + 25 % RDN through FYM (N₂) during both the years (2019-20 and 2020-21). The maximum mean grain, stalk and total phosphorous uptake was recorded in treatments in which application of 75 % RDN through fertilizers + 25 % RDN through FYM (N₂) (9.10, 8.24 and 17.34 kg ha⁻¹, respectively) over 100 % RDN through fertilizers (N₁) (8.17, 6.56 and 14.73 kg ha⁻¹, respectively). FYM application encouraged to release the organic acids and anions into the soil which increases the availability of phosphorous in soil solution (Singh, 2017). Higher phosphorous uptake in N₂ over N₁ may be due to higher availability, dry matter production and concentration of

phosphorous in pigeonpea plant. These results were in line with the findings of Kumar and Rana (2007).

Potassium uptake

The mean grain, stalk and total (grain + stalk) potassium uptake was 15.51, 24.60 and 40.11 kg ha⁻¹, respectively. The potassium uptake in grain, stalk and total (grain + stalk) as influenced by sequential intercropping systems and integrated nutrient management practices during 2019-20 and 2020-21 were analysed statistically and presented in Table 3.

The data presented in the Table 3 revealed that, the mean grain, stalk and total potassium uptake was significantly influenced by the sequential intercropping systems during both the years of study. Sole pigeonpea (S₁) recorded significantly higher mean grain, stalk and total potassium uptake (17.90, 29.44 and 47.34 kg ha⁻¹, respectively) as compared to sequential intercropping systems viz., S₃, S₄, S₅ and S₆ and was statistically at par with S₂ (17.77, 28.03 and 45.80 kg ha⁻¹, respectively). The minimum mean grain, stalk and total potassium uptake was recorded in treatments with sequential intercropping in paired row pigeonpea + sweet corn – safflower (S₆) (12.56, 20.13 and 32.69 kg ha⁻¹, respectively) which is on par with the sequential intercropping in paired row pigeonpea + sweet corn – chickpea (S₅) (12.77, 20.71 and 33.48 kg ha⁻¹, respectively). The higher mean grain, stalk and total potassium uptake of sole pigeonpea (S₁ and S₂) than pigeonpea with sequential intercropping systems (S₃, S₄, S₅ and S₆) may be due to higher dry matter production and concentration of potassium in grain and whole plant of pigeonpea.

Higher mean grain, stalk and total potassium uptake was recorded with sequential intercropping in pigeonpea with sweet corn – chickpea (S₃) (16.48, 25.14 and 41.63 kg ha⁻¹, respectively) and pigeonpea with sweet corn – safflower (S₄) (15.55, 24.15 and 39.70, respectively) than sequential intercropping in paired row pigeonpea with sweet corn – chickpea (S₅) (12.77, 20.71 and 33.48 kg ha⁻¹, respectively) and paired row pigeonpea with sweet corn – safflower (S₆) (12.56, 20.13 and 32.69 kg ha⁻¹, respectively) during 2019-20 and 2020-21, respectively. Similar results were also observed with Kumawat *et al.* (2015).

Mean grain, stalk and total potassium uptake of pigeonpea was shown statistically significant difference between nutrient management practices i.e., 100 % RDN through fertilizers (N₁) and 75 % RDN through fertilizers + 25 % RDN through FYM (N₂) during both the years (2019-20 and 2020-21). The maximum mean grain, stalk and total potassium uptake was recorded in treatments in which application of 75 % RDN through fertilizers + 25 % RDN through FYM (N₂) (17.18, 27.12 and 44.30 kg ha⁻¹, respectively) over 100 % RDN through fertilizers (N₁) (13.83, 22.08 and 35.91 kg ha⁻¹, respectively). Combine application of FYM with inorganic fertilizers increases the availability compared to the treatments in which only inorganic fertilizers applied. This might increase the absorption of nutrients results in increased dry matter production and concentration in plants (Singh, 2017). Increased dry matter production and concentration of phosphorous in plants increased the phosphorous uptake. These results were in line with the findings of Kumawat *et al.* (2015).

Data revealed that there was no significant difference in the interaction effect of sequential intercropping systems and integrated nutrient management practices on grain, stalk and total nitrogen, phosphorous and potassium uptake during both the years of study.

REFERENCES

Indiastat. 2019. [https:// www. indiastat. com / agriculture – data / 2 / agricultural production /225/ stats.aspx](https://www.indiastat.com/agriculture-data/2/agricultural-production/225/stats.aspx).

Marer, S.B., Lingaraju, B.S and Shashidhara, G.B. 2007. Productivity and economics of maize and pigeonpea intercropping under rainfed condition in Northern Transitional zone of Karnataka. *Karnataka Journal of Agricultural Sciences*. 20(1): 1-3.

Kumar, U and Kushwaha, H.S. 2018. Studies on nutrient management in pigeonpea [*Cajanus cajan* (L) Millsp.] based intercropping system of urd bean, sesame and mung bean. *Journal of Pharmacognosy and Phytochemistry*. 7(2): 490-494.

Patil, A.B and Padmani, D.R. 2007. Nutrient uptake pattern of pigeonpea (*Cajanus cajan*) as influenced by integrated nutrient management. *International Journal of Agricultural Sciences*. 3(2): 176-178.

Kumawat, N., Singh, R.P and Kumar, R. 2015. Effect of integrated nutrient management on productivity, nutrient uptake and economics of rainfed pigeonpea (*Cajanus cajan*) and black gram (*Vigna mungo*) intercropping system. *Indian Journal of Agricultural Sciences*. 85(2): 171-176.

Kumar, A and Rana, K.S. 2007. Performance of pigeon pea (*Cajanus cajan* L.) + green gram (*Vigna radiata*) intercropping system as influenced by moisture-conservation practices and fertility level under rainfed conditions. *Indian Journal of Agronomy*. 52(1): 31–35.

Table 1: Nitrogen uptake (kg ha⁻¹) of pigeonpea as influenced by sequential inter cropping systems and integrated nutrient management practices during 2019-20 and 2020-21

Treatments	Seed			Stalk			Total		
	19-20	20-21	Mean	19-20	20-21	Mean	19-20	20-21	Mean
Sequential intercropping systems (S)									
S ₁ - Pigeonpea (180 cm)	15.49	17.45	16.47	74.69	78.46	76.58	90.97	95.91	93.44
S ₂ - Paired row pigeonpea (60-300-60 cm)	14.09	15.94	15.01	68.13	75.55	71.84	82.46	91.49	86.98
S ₃ - Pigeonpea + Sweetcorn – Chickpea	11.56	13.63	12.60	58.87	65.28	62.08	70.69	78.91	74.80
S ₄ - Pigeonpea + Sweetcorn – Safflower	11.52	13.39	12.45	58.14	61.97	60.05	69.65	75.36	72.51
S ₅ - Paired row pigeonpea + Sweetcorn – Chickpea	9.74	11.19	10.47	55.17	57.15	56.16	64.91	68.34	66.63
S ₆ - Paired row pigeonpea + Sweetcorn – Safflower	10.08	10.55	10.31	53.63	53.67	53.65	64.39	64.22	64.30
S.Em±	0.45	0.53	-	2.07	2.02	-	2.50	2.78	-
CD (p=0.05)	1.31	1.55	-	6.06	5.92	-	7.34	8.15	-
Integrated nutrient management practices (N)									
N ₁ - 100 % RDN	10.40	11.95	11.17	56.71	60.20	58.46	67.46	72.15	69.80
N ₂ - 75 % RDN + 25 % N through FYM	13.76	15.43	14.60	66.17	70.50	68.33	80.24	85.93	83.08
S.Em±	0.26	0.31	-	1.19	1.17	-	1.44	1.60	-
CD (p=0.05)	0.75	0.90	-	3.50	3.42	-	4.24	4.71	-
Interactions (S x N)									
S.Em±	0.63	0.75	-	2.92	2.86	-	3.54	3.93	-
CD (p=0.05)	NS	NS	-	NS	NS	-	NS	NS	-
General Mean	12.08	13.69	12.88	61.44	65.35	63.39	73.85	79.04	76.44
CV (%)	9.03	9.47	-	8.23	7.57	-	8.30	8.61	-

RDN- Recommended dose of nitrogen through fertilizers; FYM- Farm yard manure

Table 2: Phosphorous uptake (kg ha⁻¹) of pigeonpea as influenced by sequential inter cropping systems and integrated nutrient management practices during 2019-20 and 2020-21

Treatments	Seed			Stalk			Total		
	19-20	20-21	Mean	19-20	20-21	Mean	19-20	20-21	Mean
Sequential intercropping systems (S)									
S ₁ - Pigeonpea (180 cm)	10.04	11.34	10.69	8.39	8.81	8.60	18.42	20.15	19.29
S ₂ - Paired row pigeonpea (60-300-60 cm)	9.39	10.62	10.00	8.69	9.64	9.16	18.08	20.26	19.17
S ₃ - Pigeonpea + Sweetcorn – Chickpea	8.30	9.74	9.02	6.71	7.44	7.08	15.00	17.18	16.09
S ₄ - Pigeonpea + Sweetcorn – Safflower	7.65	8.91	8.28	7.01	7.49	7.25	14.67	16.40	15.53
S ₅ - Paired row pigeonpea + Sweetcorn – Chickpea	6.58	7.57	7.07	6.07	6.29	6.18	12.65	13.85	13.25
S ₆ - Paired row pigeonpea + Sweetcorn – Safflower	6.60	6.91	6.75	6.12	6.13	6.12	12.72	13.04	12.88
S.E.m±	0.30	0.40	-	0.24	0.37	-	0.53	0.56	-
CD (p=0.05)	0.88	1.16	-	0.70	1.08	-	1.56	1.65	-
Integrated nutrient management practices (N)									
N ₁ - 100 % RDN	7.61	8.74	8.17	6.36	6.76	6.56	13.96	15.50	14.73
N ₂ - 75 % RDN + 25 % N through FYM	8.58	9.62	9.10	7.97	8.51	8.24	16.55	18.13	17.34
S.E.m±	0.17	0.23	-	0.14	0.21	-	0.31	0.32	-
CD (p=0.05)	0.51	0.67	-	0.41	0.62	-	0.90	0.95	-
Interactions (S x N)									
S.E.m±	0.43	0.56	-	0.34	0.52	-	0.75	0.79	-
CD (p=0.05)	NS	NS	-	NS	NS	-	NS	NS	-
General Mean	8.09	9.18	8.64	7.17	7.63	7.40	15.26	16.81	16.03
CV (%)	9.13	10.58	-	8.18	11.79	-	8.53	8.19	-

RDN- Recommended dose of nitrogen through fertilizers; FYM- Farm yard manure

Table 3: Potassium uptake (kg ha⁻¹) of pigeonpea as influenced by sequential inter cropping systems and integrated nutrient management practices during 2019-20 and 2020-21

Treatments	Seed			Stalk			Total		
	19-20	20-21	Mean	19-20	20-21	Mean	19-20	20-21	Mean
Sequential intercropping systems (S)									
S ₁ - Pigeonpea (180 cm)	16.82	18.98	17.90	28.70	30.17	29.44	45.52	49.15	47.34
S ₂ - Paired row pigeonpea (60-300-60 cm)	16.67	18.86	17.77	26.59	29.47	28.03	43.26	48.33	45.80
S ₃ - Pigeonpea + Sweetcorn – Chickpea	15.14	17.82	16.48	23.84	26.45	25.14	38.99	44.27	41.63
S ₄ - Pigeonpea + Sweetcorn – Safflower	14.38	16.72	15.55	23.37	24.93	24.15	37.75	41.65	39.70
S ₅ - Paired row pigeonpea + Sweetcorn – Chickpea	11.88	13.65	12.77	20.35	21.07	20.71	32.23	34.72	33.48
S ₆ - Paired row pigeonpea + Sweetcorn – Safflower	12.27	12.85	12.56	20.12	20.14	20.13	32.39	32.99	32.69
S.E.m±	0.50	0.56	-	0.85	0.85	-	1.32	1.30	-
CD (p=0.05)	1.47	1.64	-	2.50	2.48	-	3.87	3.80	-
Integrated nutrient management practices (N)									
N ₁ - 100 % RDN	12.87	14.78	13.83	21.42	22.74	22.08	34.30	37.52	35.91
N ₂ - 75 % RDN + 25 % N through FYM	16.18	18.18	17.18	26.24	28.00	27.12	42.42	46.18	44.30
S.E.m±	0.29	0.32	-	0.49	0.49	-	0.76	0.75	-
CD (p=0.05)	0.85	0.95	-	1.45	1.43	-	2.23	2.20	-
Interactions (S x N)									
S.E.m±	0.71	0.79	-	1.21	1.20	-	1.87	1.83	-
CD (p=0.05)	NS	NS	-	NS	NS	-	NS	NS	-
General Mean	14.53	16.48	15.51	23.83	25.37	24.60	38.36	41.85	40.11
CV (%)	8.43	8.31	-	8.78	8.17	-	8.42	7.59	-

RDN- Recommended dose of nitrogen through fertilizers; FYM- Farm yard manure