The Pharma Innovation Journal 2022; 11(4): 2113-2116

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(4): 2113-2116

www.thepharmajournal.com
Received: 02-02-2022
Accepted: 09-03-2022

NA Desai
Ph.D., Scholar, Department of Agronomy, Bansilal Amrutlal College of Agriculture, Anand Agricultural University, Anand, Gujarat, India

MG Chaudhary
Associate Professor, Department of Agronomy, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat, India

KR Solanki
Ph.D., Scholar, Department of Agronomy, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat, India

MG Chaudhary
Ph.D., Scholar, Department of Agronomy, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat, India

Corresponding Author:
NA Desai
Ph.D., Scholar, Department of Agronomy, Bansilal Amrutlal College of Agriculture, Anand Agricultural University, Anand, Gujarat, India

Effect of nutrient management on quality, uptake and economics of horsegram (*Macrotyloma uniflorum* L.)

NA Desai, MG Chaudhary, KR Solanki and MG Chaudhary

Abstract
A field experiment was conducted during *kharif* season of 2020 at Agronomy Instructional Farm, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, to study the "Effect of nutrient management on quality, uptake and economics of horsegram in loamy sand soil. The experiment comprised of twelve treatments *viz.*, T_1: 75% RDF, T_2: 100% RDF, T_3: 125% RDF, T_4: 75% RDF + 500 ppm thiourea at branching, T_5: 75% RDF + 500 ppm thiourea at pre-flowering, T_6: 75% RDF + 500 ppm thiourea at branching and pre-flowering, T_7: 100% RDF + 500 ppm thiourea at branching, T_8: 100% RDF + 500 ppm thiourea at pre-flowering, T_9: 100% RDF + 500 ppm thiourea at branching and pre-flowering, T_{10}: 125% RDF + 500 ppm thiourea at branching, T_{11}: 125% RDF + 500 ppm thiourea at pre-flowering and T_{12}: 125% RDF + 500 ppm thiourea at branching and pre-flowering were evaluated in randomized block design replicating three times. Significant improvement in nitrogen (52.85 kg/ha) and phosphorus uptake (10.89 kg/ha) as well as protein content (21.87) were observed under treatment T_{12}, but it was at par with treatment T_6, T_9, T_{10} and T_{11}. Available potassium in soil was not influenced significantly due to different treatments. On an average maximum net realization (`11,853/ha) and benefit: cost ratio (BCR) (1.52) were obtained with treatment T_{11} followed by treatment T_9 and T_6.

Keywords: Horse gram, RDF, thiourea, branching, pre-flowering

Introduction
Horse gram is a branched, trailing or sub erect and annual pulse crop. Its grain is used for human consumption as 'dal' as well as in preparation of so called 'rasam' and also as a concentrated feed for cattle. It may also be used as green manure. The United States National Academy of Sciences has identified this legume as a potential food source for the future (NAS, 1978) [6]. It performs well in all types of soil. It is least damaged by insect and disease despite high nutritional value. The crop requires least care and management during growing period. The crop can be stored safely for a longer period of time as the seeds are not damaged by stored grain pest. It is a food, feed and having medicinal value along with immense pertinence in sustaining and enhancing soil fertility by checking soil erosion and fixation of atmospheric nitrogen. Grain may be utilized in multifarious ways ranging from whole boiled seeds as dal to grounded flour mixed with main calorie sources like wheat flour. The seeds are used for those suffering from kidney stone which is the most prevalent problem in arid and semi-arid areas due to nagging poor quality of potent water. The sprouted grain and allied preparations of horsegram are extensively used for getting better sleep, curing irregular menstrual cycle and urinary problems in women, reducing acidity, curing whooping cough, constipation and piles.
Horsegram is the fifth most widely grown pulse species in modern India. It is amongst the most ubiquitous archaeological pulse finds, indicating that it has been of widespread importance since the Neolithic period. In India, it is generally grown in Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Maharashtra, West Bengal, Bihar, Orissa, Rainfed areas of Uttar Pradesh, the tribal belts of Rajasthan and Gujarat. In India, horsegram covers an area of 0.4 million ha with production 0.247 million tonnes and productivity 618 kg per ha during 2017-18 (www.indiastat.com). In Gujarat, it is grown in punctuated pockets in tribal and difficult terrains of Dang, Surendranagar, Rajkot, Narmada, Dahod, Sabarkantha, Banaskantha and Panchmahal districts.

Material and Methods
The field experiment was laid out on Plot No. B-9 during kharif 2020 at Agronomy Instructional Farm, Department of Agronomy, Chimanbhai Patel College of Agriculture,

Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar (Gujarat). Geographically, Sardarkrushinagar is situated at 24º 19' North latitude and 72º 19' East longitude with an elevation of 154.52 metres above the mean sea level and situated in the North Gujarat Agro-climatic Zone. The climate of this region is subtropical monsoon type and falls under semi-arid region. In general, monsoon is warm and moderately humid, winter are fairly cool and dry, while summer is largely hot and dry.

The experimental field had an even topography with a gentle slope having good drainage. The soil of the experimental plot was loamy sand in texture, low in organic carbon (0.29%), available nitrogen (137.56 kg/ha), medium in available P_2O_5 (32.10 kg/ha) and available K_2O (250.50 kg/ha) with soil pH of 7.5.Electrical conductivity was very low showing that the soil was free from salinity hazard. The experiment comprised of twelve treatments *viz*., T_1: 75% RDF, T_2: 100% RDF, T_3: 125% RDF, T_4: 75% RDF + 500 ppm thiourea at branching, T_5: 75% RDF + 500 ppm thiourea at pre-flowering, T_6: 75% RDF + 500 ppm thiourea at branching and pre-flowering, T_7: 100% RDF + 500 ppm thiourea at branching, T_8: 100% RDF + 500 ppm thiourea at pre-flowering, T_9: 100% RDF + 500 ppm thiourea at branching and pre-flowering, T_{10}: 125% RDF + 500 ppm thiourea at branching, T_{11}: 125% RDF + 500 ppm thiourea at pre-flowering and T_{12}: 125% RDF + 500 ppm thiourea at branching and pre-flowering were evaluated in randomized block design replicating three times. The sources of fertilizers were Urea and DAP and recommended dose of fertilizers for crop is 20:40:00 NPK kg/ha. The horsegram variety 'Gujarat Dantiwada Horsegram 1' was sown on July 7th, 2020 at 45 cm row to row spacing by using recommended seed rate of 12 kg/ha. The average gross and net plot size were 5.0 m × 3.6 m and 4.0 m × 2.7 m, respectively. All other agronomic practices were adopted as per need of the crop.

Results and Discussion

Effect on quality parameters

Protein content (%) in seed

The result presented in Table 1 indicated that the protein content in seed influenced significantly by different treatments. Maximum protein content (21.87%) was found under application of 125% RDF along with 500 ppm thiourea at branching and pre-flowering (T_{12}), which was at par with rest of the treatment sexcept T_1, T_2, T_4 and T_5. Minimum protein content of 19.18% was noted withT_1 (75% RDF). The supply of nitrogen is related to the protein formation. Further, the increase in protein content might be the outcome of increased concentration of N in seed of horsegram by foliar spray of thiourea which promotes protein synthesis. Similar results were also found by Rathore *et al.* (2007), Meena *et al.* (2016) [5] and Jeengar (2012) [4].

Effect on uptake

Nitrogen uptake

Maximum nitrogen uptake by the crop (52.85 kg/ha) was noted under treatment T_{12} which received 125% RDF along with 500 ppm thiourea at branching and pre-flowering and was found at par withT_6, T_9, T_{10} and T_{11} with corresponding values of 45.75, 50.45, 46.46 and47.28 kg/ha, respectively. Significantly the lowest nitrogen uptake (28.15 kg/ha) was noted under treatment T_1 (75% RDF). The nutrient uptake is a function of yield and nutrient concentration in plant. Thus, significant improvement in uptake of nitrogen might be attributed to their concentrations in seed and stover and associated with higher seed and stover yields. This might also be attributed to better availability of nutrients in the soil due to application of inorganic fertilizers. The results of present investigation are in close conformity with the finding of Yakadri *et al*. (2004), Choudhary *et al.* (2008) [3] and Patel *et al*. (2012) [7]. The increasing N uptake might be due to increased N supply during flowering and branching stages by foliar sprays of thiourea, result confirmed by the findings of Amin *et al.* (2014) [1] and Premaradhya *et al.* (2018) [9].

Phosphorus uptake (kg/ha)

Treatments had effect on phosphorus uptake by crop (Table 2). An application of 125% RDF along with 500 ppm thiourea at branching and pre-flowering registered maximum phosphorus uptake by crop (10.89 kg/ha), but itremained at par with treatment T_6, T_9, T_{10} and T_{11} having corresponding values of9.39, 10.57, 9.88 and 9.99 kg/ha, respectively. Whereas, minimum phosphorusup take by the crop (5.97 kg/ha) was observed with T_1 (75% RDF). This might be due to the fact that the trend of nutrient uptake was very well resembled with yield data of different treatments. The enhanced uptake of these nutrients in the corresponding treatments could be due to the increased and sustained availability of nutrients through phosphorus fertilization. The increased uptake by horse gram might be due to improvement in soil physical, chemical and biological health through application of phosphorus fertilization. The present findings are in concurrence with the findings of Walley *et al*. (2005), Rathore *et al*. (2007) and Patel *et al*. (2013) [8]. This also might be due to improved metabolic processes due to thiourea, better growth and better absorption of nutrients from root zone. These results are already in close conformity with those of Priyanka (2017) [10] and Bamniya (2009) [2].

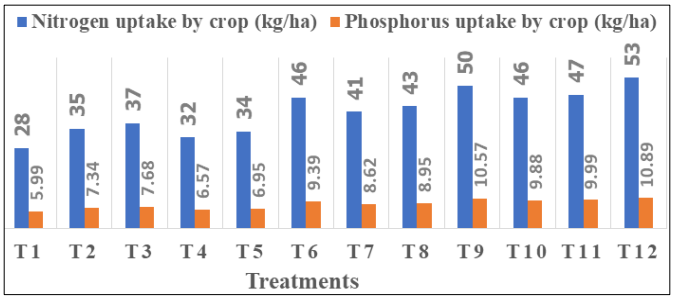

Fig 1: Show the different of nitrogen and phosphorus uptake by crop

Economics

Economics was worked out from the seed and stover yields of horsegram by taking into account the prevailing market selling prices. The data on economics of different treatments are presented in Table 3. A perusal of data revealed that the highest gross realization (`35,384/ha) was incurred under treatment $T_{12}$ (125% RDF along with 500 ppm thiourea at branching and pre-flowering). The next better treatment in view of gross realization (`35,116/ha) was T9 (100% RDF along with 500 ppm thiourea at branching and pre-flowering). Highest net realization (`11,853/ha) was incurred under treatment T_{11} (125% RDF along with 500 ppm thiourea at pre-flowering) with the benefit: cost ratio (BCR) value of 1.52.

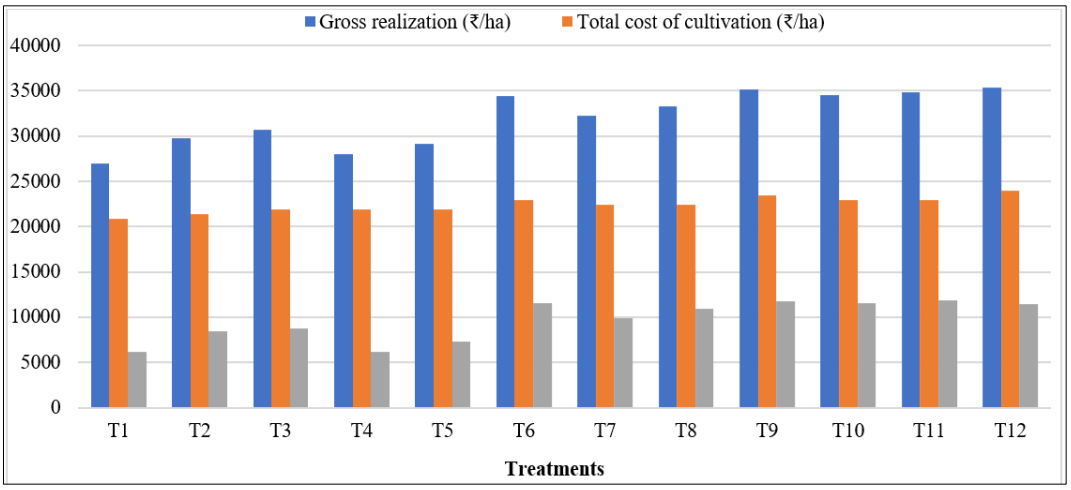

Fig 2: Gross realization and total cost of cultivation

Table 1: Protein content in seed of horsegram as influenced by different treatments

Treatments		Protein content (%)
T_1:	75% RDF	19.18
T_2:	100% RDF	19.94
T_3:	125% RDF	20.23
T_4:	75% RDF + 500 ppm thiourea at branching	19.55
T_5:	75% RDF + 500 ppm thiourea at pre-flowering	19.73
T_6:	75% RDF + 500 ppm thiourea at branching and pre-flowering	21.18
T_7:	100% RDF + 500 ppm thiourea at branching	20.60
T_8:	100% RDF + 500 ppm thiourea at pre-flowering	20.82
T_9:	100% RDF + 500 ppm thiourea at branching and pre-flowering	22.42
T_{10}:	125% RDF + 500 ppm thiourea at branching	21.22
T_{11}:	125% RDF + 500 ppm thiourea at pre-flowering	21.29
T_{12}:	125% RDF + 500 ppm thiourea at branching and pre-flowering	21.87
	S.Em.±	0.65
C.D. at 5%		1.91
C.V.%		5.50

Table 2: Nitrogen and phosphorus uptake by horsegram as influenced by different treatments

Treatments		Nitrogen uptake (kg/ha)	Phosphorus uptake (kg/ha)
T_1:	75% RDF	28.15	5.97
T_2:	100% RDF	35.18	7.32
T_3:	125% RDF	37.10	7.66
T_4:	75% RDF + 500 ppm thiourea at branching	32.39	6.55
T_5:	75% RDF + 500 ppm thiourea at pre-flowering	33.94	6.93
T_6:	75% RDF + 500 ppm thiourea at branching and pre-flowering	45.75	9.37
T_7:	100% RDF + 500 ppm thiourea at branching	40.91	8.60
T_8:	100% RDF + 500 ppm thiourea at pre-flowering	42.58	8.93
T_9:	100% RDF + 500 ppm thiourea at branching and pre-flowering	50.45	10.55
T_{10}:	125% RDF + 500 ppm thiourea at branching	46.46	9.86
T_{11}:	125% RDF + 500 ppm thiourea at pre-flowering	47.28	9.99
T_{12}:	125% RDF + 500 ppm thiourea at branching and pre-flowering	52.85	10.89
S.Em.±		2.5066	0.5727
C.D. at 5%		7.35	1.6797
C.V.%		11.00	12.10

Conclusions

Based on the results of one year experimentation, it is concluded that higher quality, uptake and net return can be secured by horsegram with application of75% RDF with 500 ppm thiourea at branching and pre-flowering.

References

1. Amin AA, Abouziena HF, Abdelhamid MT, Rashad ESM, Gharib AF. Improving growth and productivity of faba bean plants by foliar application of thiourea and aspartic acid. International Journal of Plant and Soil Science. 2014, pp. 724-736.
2. Bamniya PK. Effect of thiourea and zinc on productivity of mungbean [*Vigna radiata* (L.) Wilczek]. M.Sc. (Agri.) Thesis (Unpublished). Rajasthan Agricultural University, Bikaner, 2009.
3. Choudhary RL, Choudhary AA, Khawale VS, Potkile SN, More SR. Nutrient management studies in chick pea (*Cicer arietinum*). Journal of Soils and Crops. 2008;18(1):174-177.

4. Jeengar CL. "Effect of different fertility levels and thiourea on growth, yield andquality of mungbean (*Vigna radiata* (L.) Willczek)." M.Sc. (Agri.), Thesis submitted to S.K.N. College of Agriculture Jobner, Swami Keshwan and Rajasthan Agricultural University, Bikaner (Rajasthan), 2012.
5. Meena VK, Kaushik MK, Kumar R, Magan Singh, Meena BL, Meena BP, *et al*. Influence of growth regulators on nutrient concentrations, nutrient uptake and quality parameters of cluster bean varieties. Legume Research. 2016;39(5):797-801.
6. NAS (National Academy of Science). Tropical Legumes: Resources for the future, National Academy of Sciences, Washington, D.C., 1978, 75 pp.
7. Patel RD. Response of different cultivar of greengram to integrated nutrient management under South Gujarat condition. Thesis (Unpublished) Navsari Agricultural University, Navsari, 2012.
8. Patel RD, Patel DD, Chaudhari MP, Vaishali Patel KG, Tandel BB. Response of different cultivars of greengram to integrated nutrient management under South Gujarat condition. AGRES- An International e-Journal, 2013;2(2):132-142.
9. Premaradhya N, Shashidhar KS, Jeberson S, Krishnappa R, Singh N. Effect and profitability of foliar application of thiourea on growth and yield attributes of Lentil (*Lens culinaris* L.) under Manipur conditions of north-east, India. International Journal of Current Microbiology and Applied Sciences. 2018;7(5):1040-1050.
10. Priyanka. Effect of zinc and thiourea application on growth and yield of greengram [*Vigna radiata* (L.) Wilczek]. M.Sc. (Agri.) Thesis (Unpublished). Sri Karan Narendra Agriculture University, Jobner, 2017.
11. Pagar H, Athawale G, Raichurkar S. Effect of soaking, germination and drying on anti-nutrients, minerals and functional properties of horse gram along with its commercial application. International Journal of Food Science and Nutrition. 2021:50-4.