



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(8): 2814-2816
© 2023 TPI

www.thepharmajournal.com

Received: 18-05-2023

Accepted: 23-06-2023

Shailesh K Singh
KVK Barabanki, University of
Agriculture and Technology,
Kumarganj, Ayodhya,
Uttar Pradesh, India

SK Tomar
Krishi Vigyan Kendra, Belipar,
Gorakhpur, Uttar Pradesh, India

SK Bargaha
Krishi Vigyan Kendra, Ayodhya,
Uttar Pradesh, India

M Kumar
Krishi Vigyan Kendra, Belipar,
Gorakhpur, Uttar Pradesh, India

TS Tomar
Janta Vedic College, Baraut,
Uttar Pradesh, India

Corresponding Author:
Shailesh K Singh
KVK Barabanki, University of
Agriculture and Technology,
Kumarganj, Ayodhya, Uttar
Pradesh, India Telangana, India

Effect of soluble fertilizer, VAM and sea weed extract on yield, yield attributes and economics of wheat in rice-wheat cropping system

Shailesh K Singh, SK Tomar, SK Bargaha, M Kumar and TS Tomar

Abstract

A field experiment was conducted to evaluate the growth, yield, nutrient uptake and economics of wheat (*Triticum aestivum* L.) in rice – wheat cropping system under the combined use of soluble fertilizer and sea weed extract with the recommended dose of N, P and K and 75% dose of NPK at KVK Farm of Haidergarh, Barabanki (U.P.) during 2019-20 and 2020-21 in collaboration of IFFCO. Soluble NPK and sea weed extract (Sagarika) turned into provided through IFFCO. Application of recommended dose of NPK (RDF) with three spray of soluble fertilizer NPK @ 1.5% + sea weed extract @ 2. Five ml/litre of water + seed remedy with VAM (vesicular arbuscular mycorrhiza) at par with one hundred% of advocated dose + 3 spray of soluble NPK @ 1.5% and a hundred% of Recommended dose + three spray of soluble NPK @ 1. Five% + tank combined extract of sea weed @ 2.5 ml/litre of water recorded highest fertile tillers, no of grain, take a look at weight, grain and straw yield over rest of the treatment examined. Application of 75% NPK of advocated dose with three spray of soluble NPK tank mixed with sea weed extract + seed treatment with VAM at par with by using 75% of endorsed dose + 3 spray of soluble NPK @ 1.5% tank blended with extract of sea weed@ 2.5 ml/litre of water recorded significantly higher grain and straw yield than software of encouraged dose of NPK failed to produce equal yield to application of 100% recommended dose of NPK. Application of VAM in combination of soluble fertilizer at 75% RDF increased the yield by 10.8% while combined use of VAM and sea weed extract increased the grain yield 24.3% over combination of soluble fertilizer at 75% RDF. Application of sea weed extract in combination of soluble fertilizer at 75% RDF registered 17.4% higher yield over combination of soluble fertilizer at 75% RDF. Highest net return (Rs. 75279) and B: C ratio (2.57) recorded with recommended dose of NPK (RDF) + 3 spray of soluble fertilizer N P K @ 1.5% + sea weed extract @ 2.5 ml/litre of water + seed treatment with VAM followed by 100% of Recommended dose + three spray of soluble NPK @ 1.5% +VAM and a hundred% of Recommended dose + 3 spray of soluble NPK @ 1. Five% + sea weed extract.

Keywords: Soluble fertilizer, VAM, sea weed, yield, yield attributes, economics, wheat, rice-wheat

Introduction

Rice and wheat are staple meals crops of the arena cultivated on a place around 370.Four m ha. A large proportion of worldwide population is predicated on rice and wheat for every day caloric consumption, income and employment. Rice-wheat cropping system is one of the fundamental cropping systems in South Asia and is practiced in 14 million hectares region presenting meals for more than 400 million human beings. The rice-wheat manufacturing systems are essential to employment, income, and livelihoods for loads of thousands and thousands of rural and urban populace of South Asia (Saharawat *et al.*, 2010) [7]. This gadget covers about 10.5 million hectares in India contributes 26% of total cereal manufacturing, 60% of total calorie consumption and about 40% of the us of a's total meals basket (Sharma *et al.*, 2015) [8]. In India rice occupies nearly 44.1 million hectares area, one zero five.5 million tonnes general manufacturing. The NARS and IARS have been pursuing competitive method to keep the momentum of yield boom on this cropping machine. In this system continuous use of inorganic fertilizers and imbalanced use of fertilizers, yield is stagnate or decreasing. Hence need to use organic fertilizers or other sources of nutrients for increase the yield of rice and wheat in this system. Sea weed extract prepared liquids have recently gained importance as foliar sprays for almost all crops. Sea weed extract incorporates predominant and minor vitamins, amino acid, vitamins, cytokinins, auxin and abscisic acid like increase selling materials(Mooney and Van staden, 1986) [9] and have been stated to stimulate the boom of flora(Rama Rao 1991) [6], increase tolerance to environmental strain (Zhang *et al.*, 2003) [11],

increase nutrient uptake from soil (Turan and Kose, 2004) [10]. In rice wheat cropping system especially Calcareous soils are renowned for inflicting problem inside the supply of crop plant life with sufficient amounts and balanced proportions of mineral vitamins factors, mainly P, iron(Fe), and Zn (Alloway, 2008) [1]. Arbuscular mycorrhizal fungi are in the main known as uptake facilitators of phosphorus (P), zinc (Zn), and some different plant vitamins in scarce deliver from soil (Treseder, 2013) [2]. The present study was therefore, undertaken to evaluate the effects of VAM and sea weed extract with soluble fertilizer in differential NPK fertilizer dose in wheat grown after rice.

Materials and Methods

A field experiment was conducted using wheat range HD 2967 on loam soil of KVK Sohna, Siddharthnagar Farm at some point of wintry weather season 2016-17 and 2017-18. Soluble NPK and sea weed extract changed into furnished via IFFCO. The pH of soil turned into 7.8, natural carbon 0.15%, 202 kg available N, 27 kg P₂O₅ and 330 kg available K₂O. The experiment becomes laid out in randomized block layout with 10 treatments, replicated thrice. Detail of treatments is given in table 1. Wheat variety was sown on 10th November and 12 November 2019 and 2020 respectively using super seeder. 100 kg seed of wheat variety DBW 187 was used for sowing. VAM was used for seed treatment and sea weed extract was used for foliar spray as per treatment. Soluble fertilizer (18:18:18 NPK) and VAM was provided by IFFCO Barabanki. Three Irrigations were applied during crop period. Recommended dose of fertilizer (150:60:60 kg NPK/ha) was applied as per treatment. Weed was managed by herbicides at post emergence in both the years. Just after harvesting of paddy crop, field was irrigated and sowing was done with super seeder in partial residue. Potassium was applied at first irrigation with urea as per treatment. The facts accrued from experiment had been subjected to statistical test through following "Analysis of variance technique" as suggested with the aid of Panse and Sukhatme (1985) [3].

Result and Discussion

The data pertaining to mean of two years have been presented in table -1 showed yield attribues, grain yield and straw yield

differed significantly with the treatments. highest yield and yield attributes were recorded with 100% of Recommended dose + 3 spray of soluble NPK @ 1.5% tank mixed with extract of sea weed @ 2.5 ml/litre of water + VAM which was at par with application of One hundred% of Recommended dose + 3 spray of soluble NPK @ 1.5% tank blended with extract of sea weed @ 2.5 ml/litre of Water and 100% of Recommended dose + three spray of soluble NPK @ 1.5% + VAM which become notably higher than rest of the remedy examined. Application of VAM or seaweed extract with recommended dose +3 foliar spray of soluble NPK gave significantly higher grain yield and fertile tillers than alone Software of encouraged dose of NPK and 3 spray of soluble NPK. Application of seventy five% of recommended dose + 3 spray of soluble NPK @ 1. Five% tank combined with extract of sea weed @ 2.5 ml/litre of water +VAM at par with one hundred% of Recommended dose + three spray of soluble NPK @ 1.5% registered higher test weight and grain yield than 75% of Recommended dose + VAM, 75% of Recommended dose + 3 spray of soluble NPK and 75% of Recommended dose + 3 spray of soluble NPK @ 1.5% + VAM. Application of VAM without Soluble fertilizer at 75% RDF recorded higher yield over 75% of RDF + VAM, 75% of RDF + 3 spray of soluble NPK. It means that reduction of in RDF by 25% + 3 spray of soluble NPK failed to produce equal yield of 100% RDF. However combined application of VAM and sea weed extract at 75% RDF recorded significantly higher yield and yield attributes than 100% RDF. Significant effect of sea weed extract on yield of soyabean was also reported by Rathore *et al* (2009) [5]. It might be due to adequate supply of NP and K to the plants with the application of 75% RDF and spray of sea weed extract in early stage improved the growth parameters which are considered to be important with respect to yield attributes and yield. Late application of sea weed extract had a beneficial effect on kernel yield because leaves took longer to senesce would have increased the photosynthetic capacity of the treated plant which resulted increase in the available assimilate for distribution to the developing spikelet's. This suggest that during the reproductive phase, transport of nitrogenous substance into the caryopsis was stimulated (Nelson and Staden 1986) [9].

Table 1: Effect of incorporated nutrient management on yield of wheat (Mean of 2 years)

Treatment	Fertile tillers/ (m ²)	Grain /ear	Test weight (g)	Grain yield (q/ha)	Straw Yield (q/ha)
T ₁ =75% of Recommended dose + VAM	321	38	40.3	34.6	43.5
T ₂ =75% Of Recommended dose + 3 spray of soluble NPK	347	40	40.1	39.5	48.2
T ₃ =75% Of Recommended dose + three spray of soluble NPK @ 1.5% + VAM	376	43	41.2	43.8	54.6
T ₄ =75% of Recommended dose + 3 spray of soluble NPK @ 1.5% tank combined with extract of sea weed@ 2.5 ml/litre of Water	391	45	41.9	46.4	57.4
T ₅ =Seventy five% of Recommended dose + three spray of soluble NPK@ 1.5% tank blended with extract of sea weed@ 2.5 ml/litre of water +VAM	410	47	43.1	49.1	58.3
T ₆ =One hundred% of Recommended dose + three spray of soluble NPK @ 1.5%	415	44	43.2	49.2	60.2
T ₇ =100% of Recommended dose + 3 spray of soluble NPK @ 1.5% +VAM	444	46	43.4	52.5	64.3
T ₈ =A hundred% of Recommended dose + three spray of soluble NPK @ 1.5% tank mixed with extract of sea weed @ 2.5 ml/litre of Water	451	48	43.5	52.7	65.4
T ₉ =One hundred% of Recommended dose + three spray of soluble NPK @ 1.5% tank mixed with extract of sea weed @ 2.5 ml/litre of water + VAM	470	51	43.8	54.3	69.2
T ₁₀ =A hundred% of Recommended dose (150:60:60 kg NPK/ha)	350	42	41.3	42.4	47.5
CD(P=0.05)	22	2.3	0.7	2.6	3.7

Economics

Highest net go back Rs. 75279/ha and B: C ratio 2.Fifty seven

became recorded with 100% of endorsed dose of NPK + three spray of soluble NPK @ 1. Five% tank combined with extract

of sea weed @ 2.5 ml/litre of water + VAM which was drastically higher than rest of the treatment tested. Treatment a hundred% of endorsed dose + 3 spray of soluble NPK @ 1.5% + VAM and 100% of Recommended dose of NPK + three spray of soluble NPK @ 1.5% tank mixed with extract of sea weed @ 2.5 ml/litre of water being at par produced appreciably higher net return over the relaxation of the remedies however higher B: C ratio changed into recorded with a hundred% of recommended dose + 3 spray of soluble NPK @ 1.5% + VAM. Application of a hundred% of recommended dose + 3 spray of soluble NPK @ 1.5% and 75% of recommended dose + three spray of soluble NPK @ 1.5% tank combined with extract of sea weed @ 2.5 ml/litre of water +VAM recorded similar net return which was significantly higher over T₁, T₂ and T₃ but Higher B: C ratio

was registered with T₅ followed by T₄ than T₆ and T₁, T₂ and T₃. Application of sea weed extract with 75% RDF and 3 spray of soluble NPK gave higher net return (Rs. 5685/ha) and B: C ratio than application of VAM with same dose of NPK and 3 spray of soluble NPK. It was also registered that net return and B:C ratio increased markedly when VAM and sea weed extract applied in a combination with 75% of RDF and 3 spray of soluble NPK than alone application of VAM and sea weed extract with same dose of NPK and soluble NPK. Application of 100% of recommended dose (150:60:40 kg NPK/ha) recorded higher yield than 75% of Recommended dose + VAM and 75% of recommended dose + 3 spray of soluble. Lowest net return and B: C ratio was recorded with 75% of recommended dose + VAM.

Table 2: Effect of integrated nutrient management on economics of wheat

Treatment	Cost of cultivation (Rs. /ha)	Net return (Rs. /ha)	B:C ratio
T ₁ =75% of Recommended dose + VAM	40500	37684	1.93
T ₂ =75% of Recommended dose + 3 spray of soluble NPK	43300	45518	2.05
T ₃ =75% of Recommended dose + three spray of soluble NPK @ 1.5% + VAM	43500	55333	2.27
T ₄ =75% of Recommended dose + 3 spray of soluble NPK @ 1.5% tank combined with extract of sea weed@ 2.5 ml/litre of Water	43550	61018	2.40
T ₅ =75% of Recommended dose + three spray of soluble NPK @ 1.5% tank blended with extract of sea weed @ 2.5 ml/litre of water +VAM	44400	65520	2.47
T ₆ =100% of Recommended dose + three spray of soluble NPK @ 1.5%	46200	64479	2.39
T ₇ =100% of Recommended dose + 3 spray of soluble NPK @ 1.5% +VAM	46500	71621	2.54
T ₈ =100% of Recommended dose + three spray of soluble NPK @ 1.5% tank mixed with extract of sea weed @ 2.5 ml/litre of Water	47500	71327	2.50
T ₉ =100% of Recommended dose + three spray of soluble NPK @ 1.5% tank mixed with extract of sea weed @ 2.5 ml/litre of water + VAM	47700	75279	2.57
T ₁₀ =100% of Recommended dose (150:60:60 kg NPK/ha)	43100	50968	2.18
CD(P=0.05)		2425	

Conclusion

It was concluded that in rice – wheat cropping system wheat yield and net return can be increased using VAM, sea weed extract with RDF 150:60:60 kg NPK along with 3 spray of soluble NPK @ 1.5%. Use of VAM + 3 spray of soluble NPK with sea weed extract may save 25% fertilizer (NPK).

References

- Alloway BJ. Zinc in soils and crop nutrition. 2nd Editon, IZA and IFA; c2009.
- Treseder KK. The extent of mycorrhizal colonization of roots and its influence on plant growth and phosphorus content. *Plant and Soil*. 2013;371:1-13.
- Panse VG, Sukhatme PV. Statistical methods for agricultural workers, 4th enlarged edition, Indian Council of Agricultural Research Pub. New Delhi; c1985.
- Nelson QR, Taden V. Effect of sea weed extract concentrate on the growth of wheat. *South African Journal of Science*. 1986;82:199-200.
- Rathore SS, Chaudhary DR, Boricha GN, Gosh A, Bhatt BP, *et al.* Effect of seaweed extract on the growth, yield and nutrient uptake of soybean (*Glycine max*) under rainfed conditions. *South African Journal of Botany*. 2009;75:351-355.
- Rama Rao K. Effect of seaweed extract on *Zyziphus mauritiana* Lamk. *Journal of Indian Botanical Society*. 1991;71:19-21.
- Saharawat YS, Singh B, Malik RK, Ladha JK, Gathala M, Jat ML, Kumar V. Evaluation of alternative tillage and crop establishment methods in a rice-wheat rotation

in North Western IGP. *Field Crop Res*. 2010;116:260-267.

- Sharma PC, Jat HS, Kumar V, Gathala, MK, Datta, A, Yaduvanshi NPS, *et al.* A Sustainable Intensification Opportunities under Current and Future Cereal Systems of North-West India. *Technical Bulletin: CSSRI/Karnal/2015/4*. Central Soil Salinity Research Institute, Karnal; c2015. p.46.
- Mooney PA, Van Staden J. Algae and cytokinins. *Journal of Plant Physiology*. 1986;123:1-2.
- Turan M, Köse C. Seaweed extracts improve copper uptake of grapevine. *Acta Agricultrae Scandinavica*. Section B, *Soil and Plant Science*. 2004;54:213-220.
- Zhang X, Ervin EH, Schmidt ER. Plant growth regulators can enhance the recovery of Kentucky bluegrass sod from heat injury. *Crop Science*. 2003;43:952-956.