Biological Forum – An International Journal **13(3a): 765-768(2021)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Influence of Methods of Sowing and Seaweed (*Kappaphycus alvarezii*) Extract on Growth and Yield of Wheat (*Triticum aestivum* L.)

Baratam Santosh Kumar[1*], Rajesh Singh[2] and Ekta Singh[3]

[1]M.Sc. Researh, Scholar, Department of Agronomy, NAI, SHUATS, Prayagraj, (Uttar Pradesh), India.
[2]Assistant Professor, Department of Agronomy, NAI, SHUATS, Prayagraj, (Uttar Pradesh), India.
[3] Ph.D. Research Scholar, Department of Agronomy, NAI, SHUATS, Prayagraj, (Uttar Pradesh), India.

(Corresponding author: Baratam Santosh Kumar)*
(Received 16 July 2021, Accepted 30 September, 2021)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Planting methods performs crucial role in placement of seed at right depth, which in the end influences crop growth. The selection of suitable method of planting depends upon the time of planting, availability of soil water at planting time, residue amount with inside the field. During the 2020-21 Rabi season, a field trial was carried out at the SHUATS crop research farm in Prayagraj to study the Influence of sowing methods and seaweed (*Kappaphycus alvarezii*) extract on the growth and yield of Wheat (*Triticum aestivum* L.). The experiment was laid out in a random block design, three sowing methods were retained, *i.e*. S1 - Broadcasting, S2 – Line sowing, and S3 – System of Wheat Intensification and Seaweed extract (*Kappaphycus alvarezii*) and which was replicated three times. With the treatment of Line sowing +7.5 % K sap recorded significantly higher in plant height (76.87 cm), test weight (36.99 g), grain yield (3.57 t/ha), and stover yield (5.07 t/ha) results were recorded. Results revealed with the treatment of SWI + 7.5% K sap number of tillers per plant (9.80), dry weight (21.01 g/plant), number of effective tillers per plant (9.53), number of grains per spike (56.33), and harvest index (41.48%). Hence, the authors concluded that s Line sowing + 7.5 % K sap can produce more grains and are economically effective.

Keywords: Broadcasting, Line sowing, System of Wheat Intensification and Seaweed extract.

INTRODUCTION

Wheat (*Triticum aestivum* L.) is one of the most important cereal crops with a unique protein (gluten), that is consumed by humans and grown in different environments around the world. Worldwide, wheat is grown on an area of around 220 million hectares with a record production of 763.06 million tonnes of grain. The maximum area beneath wheat cultivation is in India (14%), followed by Russia (12.43%), China (11.14%), and thus the USA (6.90%) which together make up about 45th of the world area. In India, wheat acreage increased from 29.04 million hectares to 30.54 million hectares with a net gain of 50 in terms area APEDA (2018).

Carver, (2005) examined the effects of different crop establishment methods, *i.e.* conventional drilling, precision drilling, and broadcasting in winter wheat. The broadcasting method produced the most effective spatial arrangements. However, there was no consistent relationship between the spatial arrangements and subsequent yield performance.

Line sowing is being practiced with proper spacing between rows, which, in addition to facilitating inter-culture and the application of appropriate chemicals for effective and effective weed control, helps to intercrop and cut back the seed rate per square measure with no adverse effect on the final grain yield (Narayan *et al.*, 2019). Line sowing is associated with judicious sowing methodology because of its uniform population per unit area. As a unit of area of the seeds planted at a consistent depth and lined with soil, a high germination, and uniform stands are expected.

The system of Wheat intensification could be a new idea and is based on the principle of the system of rice intensification (SRI). SWI, all agronomic principles of the SRI are put into practice and integrated into a package of wheat cultivation methods. A technology that has high potential, a high wheat yield per drop of water and per kg of agricultural inputs (fertilizer, seed, etc.) and the application of other SRI principles on wheat cultivation is understood as a system of wheat intensification (Dhar *et al.*, 2014).

Seaweed extract could be a natural organic fertilizer of the new generation that containing highly effective nutrients, which promotes growth and yield and also improves the resistance of many plants to biotic and abiotic stresses. In contrast to chemical fertilizers, the seaweed extracts are biodegradable, non-toxic, non-environmentally harmful, and non-hazardous to humans, animals, and birds (Dhargalkar and Pereira, 2005) having a low cost of production. Seaweed extract also contains alginates which bind soil particles and form aggregates that lead to better soil structure for growing crops and also helps to heal the harmful effects of newer chemical's agriculture. Seaweeds are preferred not only for their nitrogen, phosphorus, potassium, and micronutrients content, but also contain some metabolites as plant growth regulators such as indole compounds that favor the appearance of roots of plants and buds; Cytokines are hormones that help

cells grow rapidly through the process of cell division. When applied to the leaves as a foliar spray, they rejuvenate and stimulate photosynthesis. Application of *Kappaphycus alvarezii*- and *Gracilaria edulis* extracts has been reported to improve nutrient uptake by wheat (Shah *et al.,* 2013), possibly due to the presence of the many organic compounds and natural chelating agents (eg. manitol) in sap, which mobilizes the fixed nutrients in the available form to the plant.

MATERIALS AND METHODS

Site selection and soil analysis. The experiment waa carried out during the 2020-21 Rabi season, at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh. The Crop Research Farm is located at 25º 24′41.27″N latitude, 81°50′56″E line of longitude, and 98 m above mean water level. The experiment was carried out in a sandy clay loam soil in the east of Uttar Pradesh. The soil reaction on the soil test was almost neutral. (pH– 7.4), low in organic carbon (0.306%), medium in available nitrogen (225 kg/ha), medium in available phosphorous (13.90 kg/ha), and medium in available potassium (243.5 kg/ha).

Experimental design and treatment combinations. The experiment was laid out in Random Block Design with 3 replications. A total of 9 treatments included all possible combinations of sowing methods (Broadcasting, Line sowing and SWI) and foliar spray of seaweed at 0%, 5%, and 7.5% respectively. T1. Broadcasting + 0 % K Sap, T2. Broadcasting + 5 % K Sap, T3. Broadcasting + 7.5 % K Sap, T4. Line sowing + 0% K Sap, T5. Line sowing + 5% K Sap, T6. Line sowing + 7.5 % K Sap, T7. SWI + 0 % K Sap, T8. SWI + 5 % K Sap, T9. SWI + 7.5 % K Sap.

Fertilizer application and Trait Measurement. The number of different fertilizers required to provide the necessary amounts of nutrients was calculated for each plot. The sector observation on plant height, no. of tillers, dry weight, grain, and stover yields were recorded. To determine the most profitable treatment, the economics of each treatment was a workout on imagining the prevailing market prices for inputs and outputs.

Statistical Analysis. The recorded data which had different characteristics, were subjected to statistical analysis using Fisher's analysis of variance (ANOVA) as described by Gomez and Gomez (2010). Critical difference (CD) values were calculated in the 'F' test was found significantly at 5% level.

RESULTS AND DISCUSSION

The growth parameters shown in Table 1 such as plant height, tillering number and plant dry weight as well as the yield attributes and yields in Table 2 were significantly influenced by methods of sowing and seaweed (*Kappaphycus alvarezii)* extract.

Growth attributes. Data pertaining to Growth parameters of Wheat *viz.,* Plant height, Plant dry weight and Number of tillers were as influenced by different sowing methods and seaweed extract in Table 1. At harvest, treatment with Line sowing + K Sap 7.5% was recorded higher plant height (76.87 cm) which were significantly higher overall treatments. However, treatment with Line sowing + 5% K Sap and SWI + 7.5% K Sap were statistically on par with Line sowing + 7.5% K Sap. Different seaweed concentrations were significantly affected on the wheat plant in several sowing methods and among three sowing methods, plant with line sowing was shown significant plant height. Plant growth hormones in seaweed extracts are primarily responsible for stimulating plant growth and thus increasing the intensity of photosynthesis. Rice plant height gradually increased because the growth progressed. This was mainly due to a rise in the length of leaves and the size of panicles until harvest (Singh *et al.,* 2015 b). Significantly, the higher plant height is due to the presence of major & minor nutrients, amino acids, vitamins, cytokinin's, auxins, and growth promoting substances similar to the abscisic acid in the seaweed extract (Mooney and Van Staden 1986).

Table 1: Influence of methods of sowing and seaweed (*Kappaphycus alvarezii*) extract on Growth attributes of wheat.

Treatments	Growth attributes		
	Plant height	Dry weight/plant	No. of tillers/plant
Broadcasting + 0% K sap	68.95	17.37	5.50
Broadcasting + 5% K sap	69.65	19.51	5.03
Broadcasting + 7.5% K sap	71.37	18.77	4.87
Line sowing + 0 % K sap	72.28	18.76	6.33
Line sowing + 5 % K sap	74.47	17.97	6.37
Line sowing + 7.5% K sap	76.87	18.36	6.53
SWI + 0% K sap	72.11	19.11	9.33
SWI + 5% K sap	71.01	20.17	9.53
SWI + 7.5% K sap	73.29	21.01	9.80
SEm (±)	1.37	0.43	0.24
CD(p=0.05)	4.08	1.28	0.72

At harvest time, the treatment with SWI + 7.5% K Sap was showed higher dry weight of the plant (21.01g), which was significant compared to all other treatments. However, treatment SWI + 5% K Sap was statistically on par with SWI + 7.5% K Sap. The accumulation of dry matter is the sum of all overall growth effects. Seaweed sap foliar application which increased the plant height, tillers per meter square and the leaf area

index showed a higher photosynthetic efficiency, which gradually led to a higher accumulation of dry matter in the rice crop. (Singh *et al.,* 2018). An increase in dry weight may be due to seaweed sap foliar application which improves the mobilization of nutrients, partitioning in increase in leaf area, crop rate and dry weight in wheat. (Zodape *et al.,* 2009).

At the time of harvest, the treatment with SWI + 7.5% K sap was recorded the maximum tillers per plant (9.80) which was significant among all the treatments. However, SWI + 5% K sap and SWI + 0% K sap were statistically at par with SWI + 7.5% K Sap. The seaweed extract helps in increases the number of tillers of rice plants because of the presence of assorted active compounds, micro and macronutrients within the extract of seaweeds (macroalgae). When using K sap over G sap at 60,90 DAT and at harvest, a significant improvement in total tillers/m^2 of rice was recorded, which could lead to a higher concentration of zeatin and betaine in K sap as compared to G-sap (Singh *et al.,* 2018).

Yield attributes. Data related to yield attributes *viz.*, effective tillers/plant, grains/spike and test weight (g) in Table 2. The maximum number of effective tillers/ plant (9.53) and number of grains/spike (56.33) were recorded with a treatment combination of SWI + 7.5% K Sap were significantly superior over all other treatments (Table 2) followed by SWI + 5% K Sap. Maximum test weight (36.99 g) was recorded with a treatment combination of Line Sowing + 7.5% K Sap which was significant over all other treatments. However, treatment with SWI + 7.5% K Sap was statistically on par with Line Sowing + 7.5% K Sap.

Yield. Data regarding yield-related parameters *viz.*, Economic yield (t/ ha), stover yield (t/ha), and harvest index (%) in Table 2. It revealed that treatment with Line sowing + 7.5% K Sap was recorded maximum economic yield (3.57 t/ ha) and the stover yield (5.07 t/ha) which were significantly superior over all other treatments. However, treatment with SWI + 7.5% K Sap and Line sowing + 5% K Sap were statistically on par with Line sowing + 7.5% K Sap. The application of K-sap resulted in maximum and significantly higher straw and economic yields of rice than G-sap. Higher yield and growth charateristics with K-sap will cause higher grain and straw yield of rice with K-sap. This was in conformity with the result of (Singh *et al.,* 2015 b).

Table 2: Influence of methods of sowing and seaweed (*Kappaphycus alvarezii*) extract on Yield attributes and Yield related parameters of wheat.

Treatments	Yield attributes			Yield Related parameters		
	Effective tillers	Grains /spike	Test weight (g)	Grain yield (t/ ha)	Stover yield (t/ ha)	Harvest Index(%)
Broadcasting +0 % K sap	5.2	35.33	26.11	2.17	4.24	33.82
Broadcasting +5 % K sap	4.73	37.33	28.72	2.34	4.47	34.34
Broadcasting +7.5 % K sap	4.47	38.33	26.42	2.53	4.71	34.99
Line sowing +0 % K sap	6.03	40.67	31.60	3.16	4.66	40.37
Line sowing +5 % K sap	6.07	43.33	27.31	3.45	4.90	41.32
Line sowing +7.5 % K sap	6.23	44.00	36.99	3.57	5.07	41.30
SWI + 0% K sap	9.03	48.67	32.10	2.79	4.29	39.39
SWI + 5% K sap	9.20	54.67	33.51	3.00	4.51	39.98
SWI + 7.5% K sap	9.53	56.33	36.03	3.48	4.91	41.48
SEm(±)	0.13	1.84	0.53	0.05	0.07	0.42
CD(p=0.05)	0.38	5.47	1.59	0.15	0.197	1.25

CONCLUSION

On the basis of one season experimentation treatment combination with Line sowing + 7.5% K sap was found more productive (3.57 t/ha).

Acknowledgement. I thank my advisor Dr. Rajesh Singh for his continued support and guidance. I am thankful to Prof. (Dr.) Joy Dawson, Dr. Vikram Singh, Dr. Umesha C and Dr. Shikha Singh, Department of Agronomy.

Conflict of Interest: None.

REFERENCES

APEDA (2018). Agricultural and Processed Food Products Export Development Authority.

Carver, M. F. F. (2005). The influence of different establishment methods on performance of early drilled winter wheat. HGCA- Project Report; 375:24.

Dhar, S., Barah, B.C., & Vyas, A. K. (2014). Comparative performance of System of Wheat Intensification (SWI) and other methods of wheat cultivation in north western plain zone of India. In: International SRI Research seminar on recent Changes in Rice Production and Rural Livelihoods: New Insights on the System of Rice Intensification (SRI) as a Socio-Technical Movement in India. Indian Agricultural Research Institute, New Delhi.

Dhargalkar,V. K., & Pereira, N. (2005). Seaweed promising plant of the millennium. *Science and Culture, 71*: 60-66.

Gomez, K. A., & Gomez, A. A. (2010). Statistical Procedures for Agricultural Research.

Mooney, P. A., & Van Staden J. (1986). Algae and cytokinins.*Journal of Plant Physiology*, *123*, pp. 1-2.

Narayan Khatri, Prasad, P.B., Mamata Bista, & Lakshmi G. D. (2019). Effect of Different Wheat Variety on sSowing Methods on Grain yield of wheat under bhairahawa condition of Nepal. *Int. J. Life Sciences and Biotechnology*, *2*(3): 175-182.

Shah, M. T., Zodape, S. T., Chaudhary, D. R., Eswaran, K., & Chikara, J. (2013). Seaweed sap as an alternative liquid fertilizer for yield and quality improvement of wheat. (*Triticum aestivum*). *J. Plant Nutr*., *36*: 192-200.

Singh, S. K., Thakur, R., Singh, M. K., Singh, C. S., & Pal, S. K. (2015 b). Effect of fertilizer level and seaweed sap on productivity and profitability of rice (*Oryza sativa* L.). *Indian Journal of Agronomy, 60*(3): 420-425.

Singh, S. K., Thakur, R., Singh, C. S., Pal, S. K., & Singh, A. K. (2018). Studies on Efficacy of Seaweed Extract and Fertility Levels on Growth and Economics of Rice. *International Journal of Current Microbiology and Applied Sciences, 7*: 3056-3065.

Zodape, S. T., Mukherjee, S.,Reddy, M. P., & Chaudhary, D. R. (2009). Effect of *Kappaphycus alzarezii* (Doty) Doty ex silva extract on grain quality, yield and some yield components of wheat (*Triticum aestivum* L.). *International Journal of Plant Production*, *3*(2): 97-101.

How to cite this article: Kumar, B.S., Singh, R. and Singh, E. (2021). Influence of Methods of Sowing and Seaweed (*Kappaphycus alvarezii*) Extract on Growth and Yield of Wheat (*Triticum aestivum* L.). *Biological Forum – An International Journal*, *13*(3a): 765-768.