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Effect of spacing and seaweed (*Kappaphycus alvarezii)* extract on yield and economics of sweet corn (*Zea mays* L.)

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Abstract
An experiment was carried out during *Kharif* season of 2021 at Crop Research Farm, Department of agronomy, SHUATS, Prayagraj U.P to study about the Effect of spacing and seaweed (*Kappaphycus alvarezii)* extract on yield and economics of sweet corn (*Zea mays* L.). The soil of the experimental field is sandy loam in texture, nearly neutral in soil reaction (Ph 7.4), the available N, P, K fertilizers is applied through inorganic fertilizers i.e UREA, SSP, MOP. The experiment consisted of nine treatments which includes 2 Spacings i.e., 45 cm x 20 cm and 60 cm x 15 cm and foliar application of seaweed extract (*Kappaphycus alvarezii*) whose effect is observed in sweetcorn (Syngenta Sugar -75). The experiment was laid out in Randomized Block Design with nine treatments replicated thrice. Results revealed with the treatment of Spacing 60 cm x 15 cm + 5.0% K sap recorded maximum number of cobs / plant (2.10), grains / cob (503.33), Number of seeds per row (38.76), Length of cob (16.81cm), cob yield 4.24 t/ha) and stover yield (4.78 t/ha). Higher gross returns (126663.00 INR/ha), net returns (85063.1 INR/ha), and B: C ratio (2.04) was also obtained with the application of spacing 60 cm x 15 cm + 5.0% K sap. Therefore, authors concluded that spacing 60 cm x 15 cm + 5.0% K sap can produce more cobs and will be economically effective.

Keywords: Sea weed, spacing, yield, economics, sweet corn etc.

Introduction
Maize is one of the most flexible emerging cash crops. It is referred to as the "Queen of Cereals" because of its better production potential and wider adaptability. Dent corn, sweet corn, baby corn, flint corn, and popcorn are among the varieties of maize farmed in the country throughout the year. Sweet corn is one of the vegetables that is commercially grown. The sugary gene in sweet corn prevents the normal conversion of sugar to starch during endosperm development, resulting in the accumulation of a water-soluble polysaccharide called "Phytoglycogen" in the kernel, making it juicy and sweet. Apart from sweetness, the higher amount of water-soluble polysaccharide provides a textural quality component, making it suitable for consumption as a vegetable. Considering maize as a high-nutrient-demanding crop, its production is heavily reliant on crop management.

In the Modern agronomic practices, proper planting population management and fertilizer administration strategies are used as critical tools for increasing crop yields. Crop geometry is a significant aspect in achieving higher yields by better utilizing moisture and nutrients from the soil and above ground (plant canopy) by harvesting as much solar radiation as possible and, as a result, better photosynthates generation. Crop geometry is influenced by a number of factors, including plant species, season, and soil fertility. In order to achieve the best plant stand in the field and thus a higher yield, the optimal crop geometry must be managed.

Moreover, due to several drawbacks, such as uncertain climate, infertile soil, and inefficient crop response, the nutritional requirements of crops and timely delivery of vital nutrients are not met. Hence foliar application of a water-soluble fertilizer is a well-known technique of plant nutrition that provides nutrients regardless of climatic or soil conditions.

In addition to soil-applied fertilisers, seaweed fertilization has become quite important. As Seaweed extract would be a revolutionary type of natural organic fertiliser that contains highly effective nutrients and boosts growth and production in a variety of crops while also boosting biotic and abiotic stress resistance. Unlike chemical fertilisers, seaweed extracts are biodegradable, non-toxic, non-polluting, and non-hazardous to people, animals, and birds (Dhargalkar, 2005). Seaweed is preferred not just for its high nitrogen, phosphate, potassium, and vitamin content, but also for its affordable price.

Seaweed extracts contain multiple growth hormones, as well as macro and micro nutrients that are crucial, and it has been discovered that applying seaweed sap to various crops has a considerable impact on several growth parameters.

Among these, *Kappaphycus alvarezii* seaweeds have shown potential as a foliar bio-stimulant for increasing crop output in a variety of agro-ecological scenarios.

In view of the findings, a field experiment titled "Effect of spacing and sea weed (*Kappaphycus alvarezii*) extract yield and economics of sweet corn " was done to investigate and develop a better spacing and sea weed concentration treatment for sweet corn in eastern Uttar Pradesh.

Materials and Methods

The experiment was carried out during *kharif* season of 2021 at crop research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj (UP). The soil of the experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.1), low in organic carbon (0.28%), medium in available nitrogen (225 Kg/ha), available Phoporous (19.50 Kg/ha) and available Potassium (92.00 Kg/ha). The treatments consisted of Spacing *viz*., 45 cm x 20 cm, 60 cm x 15 cm and Seaweed concentration (*Kappaphycus alvarezii*) *viz.*, 2.5%, 5.0%, 7.5% and water spray, whose effect is observed on sweet corn (Syngenta sugar-75). The experiment was laid out in Randomized Block Design with nine treatments replicated thrice. The experiment comprising nine possible treatment combination of above factor, *viz.*, T_1: Spacing 45 cm x 20 cm + 2.5% K SAP, T_2: Spacing 45 cm x 20cm + 5.0% K SAP, T_3: Spacing 45 cm x 20 cm + 7.5% K SAP, T_4: Spacing 45 cm x 20 cm + Water spray, T_5: Spacing 60 cm x 15 cm + 2.5% K SAP, T_6: Spacing 60 cm x 15 cm + 5.0% K SAP, T_7: Spacing 60 cm x 15 cm + 7.5% K SAP, T_8: Spacing 60 cm x 15 cm + Water spray, T_9: Control (RDF). Field observation regarding growth and yield were recorded during the field experimentation.

Results and Discussions

Yield and yield attributes

Maximum Number of cobs/plant (2.10), grains/cob (503.33), Number of rows/cob (13.20), Number of grains/row (38.76), cob length (16.81 cm), maximum cob yield (4.24 t/ha) and Stover yield (4.78 t/ha) were recorded with Spacing 60 cm x 15 cm + 5.0% K SAP.

Wider row spacing of 60 cm x 15 cm was found equally good but better than closer spacing of 45 m x 20 cm. This might be due to sufficient vegetative growth and adequate supply of moisture and nutrients under wider row spacing. The highest sweet corn yield was recorded under the spacing of 60 cm x 15 cm. Under wider row spacing of 60 cm x 15 cm, most of the growth attributing characters were at their highest (Sharifi *et al*. (2014). Shah *et al*., 2012 on wheat, who observed the lower concentration of sap increased the yield and in higher concentration (7.5% K sap or above) it decreased. Increase in yield may be due to the presence of plant growth regulator in sap as well as the minerals element present in the seaweed extract, increased the photosynthate or delay the senescence of the leaves, this would have enhanced the supply of photosynthate available for grain filling, thus resulting in bolder grain and consequently higher grain yield (Beckett and Van Staden, 1990 and Singh *et al*., 2016) [1, 7].

Economics

Maximum Gross returns (126663 /ha), Net returns (85063.1 /ha) and benefit cost ratio (2.04) was absorbed with the treatment with Spacing 60 cm x 15 cm + 5.0% K SAP and the minimum Gross returns (126663 /ha), Net returns (85063.1 /ha) and benefit cost ratio (2.04) was absorbed with the treatment with Spacing 45 cm x 20 cm + 2.5% K SAP.

Table 1: Yield attributes of sweet corn as influenced by Spacing and sea weed extract concentration

Treatments	No. of cobs/plant	No. of grain/cob	No. of rows/cob	No. of seeds/row	Length of Cob (cm)	Test weight (g)
Spacing 45 cm x 20 cm + 2.5% K SAP	1.46	434.00	12.16	32.56	16.62	116.07
Spacing 45 cm x 20cm + 5.0% K SAP	1.56	458.33	13.60	31.63	15.96	129.78
Spacing 45 cm x 20 cm + 7.5% K SAP	1.93	486.00	12.70	37.10	16.76	121.15
Spacing 45 cm x 20 cm + Water spray	1.53	451.66	12.50	32.60	15.82	119.25
Spacing 60 cm x 15 cm + 2.5% K SAP	1.90	485.66	12.83	37.40	15.83	122.43
Spacing 60 cm x 15 cm + 5.0% K SAP	2.10	503.33	13.13	38.76	16.81	125.29
Spacing 60 cm x 15 cm + 7.5% K SAP	1.63	466.33	13.20	32.66	15.89	125.92
Spacing 60 cm x 15 cm + Water spray	1.73	467.66	13.03	34.00	16.64	124.33
Control (RDF)	1.63	459.66	12.90	31.70	16.68	123.06
S.Em (+)	0.07	7.43	0.47	0.65	0.25	4.55
CD (0.05%)	0.21	22.10	NS	1.93	0.76	NS

Table 2: Yield of sweet corn as influenced by Spacing and sea weed extract concentration

Treatments	Cob yield with husk (t/ha)	Cob yield without husk (t/ha)	Stover yield (t/ha)	Harvest index (%)
Spacing 45 cm x 20 cm + 2.5% K SAP	3.83	2.15	4.12	34.29
Spacing 45 cm x 20cm + 5.0% K SAP	3.96	2.28	4.19	35.24
Spacing 45 cm x 20 cm + 7.5% K SAP	4.15	2.49	4.56	35.41
Spacing 45 cm x 20 cm + Water spray	4.01	2.33	4.42	34.56
Spacing 60 cm x 15 cm + 2.5% K SAP	4.15	2.47	4.60	35.05
Spacing 60 cm x 15 cm + 5.0% K SAP	4.24	2.56	4.78	34.92
Spacing 60 cm x 15 cm + 7.5% K SAP	4.00	2.32	4.35	34.76
Spacing 60 cm x 15 cm + Water spray	3.89	2.27	4.25	34.80
Control (RDF)	3.82	2.17	4.26	33.73
S.Em (+)	0.04	0.04	0.09	0.51
CD (0.05%)	0.13	0.12	0.28	NS

Table 3: Economics of sweet corn as influenced by Spacing and sea weed extract concentration

Treatments	Cost of cultivation (₹/ha) *	Gross returns (₹/ha) *	Net returns (₹/ha) *	B:C Ratio
Spacing 45 cm x 20 cm + 2.5% K SAP	41750	106602	64852.1	1.56
Spacing 45 cm x 20cm + 5.0% K SAP	42000	112450	70450	1.68
Spacing 45 cm x 20 cm + 7.5% K SAP	42250	122550	80300	1.90
Spacing 45 cm x 20 cm + Water spray	41500	115619	74119.2	1.79
Spacing 60 cm x 15 cm + 2.5% K SAP	41350	122122	80772.1	1.95
Spacing 60 cm x 15 cm + 5.0% K SAP	41600	126663	85063.1	2.04
Spacing 60 cm x 15 cm + 7.5% K SAP	41850	114605	72754.6	1.74
Spacing 60 cm x 15 cm + Water spray	41100	112063	70962.5	1.73
Control (RDF)	41500	108117	66616.7	1.61

Data not subjected to statistical analysis

Conclusion

On the basis of this experimentation, it is concluded that the spacing 60 cm x 15 cm + 5.0% K SAP was found the most suitable combination of spacing and sea weed concentration to be adopted in sweet corn as it was more productive, profitable and economically efficient.

References

1. Beckett RP, Van Staden J. The effect of seaweed concentrates on the yield of nutrient stressed wheat. Botanica Marina. 1990;33:147-152.
2. Devi NL, Mani S. Effect of seaweed saps *Kappaphycus alvarezii* and *gracilaria* on growth, yield and quality of rice. Indian Journal of science and Technology. 2015, 8(19). DOI: 10.17485/ijst/2015/v8:19/47610.
3. Gosavi SP, Bhagat SB. Effect of nitrogen levels and spacing on yield attributes, yield and quality parameters of baby corn. Ann. Agric. Res. 2009;30(3, 4):125-128.
4. Leindah ND, Mani S. Effect of seaweed saps *Kappaphycus alvarezii* and *Gracilaria* on growth, yield and quality of Rice. Indian journal of science and technology. 2015;8(19):0974-5645.
5. Massey JX, Gaur BL, Sumeriya HK. Effect of plant population and fertility levels on yield attributes, yield and nutrient uptake of sweet corn cultivars. International Journal of Agricultural Sciences. 2013;10(1):82-86.
6. Rathore SS, Chaudhary DR, Boricha Girish N, Ghosh A, Bhatt BP, Zodape ST, *et al*. Effect of seaweed extract on the growth, yield and quality of soybean (*Glycine max* L.) under rainfed condition. S Afr J Bot. 2009;75:351-355.
7. Singh Shikha, Singh MK, Pal SK, Trivedi K, Yesuraj D, Singh CS, *et al*. Sustainable enhancement in yield and quality of rain-fed maize through *Gracilaria* edulis and *Kappaphycus alvarezii* seaweed sap. Journal of Applied Phycology, 2016. DOI 10.1007/s10811-015-0680-8.
8. Singh Shikha, Singh MK, Singh A, Singh CS. Application of Seaweed Sap (*Kappaphycus alvarezii* and *Gracilaria* edulis) for Higher Productivity of Maize (*Zea mays* L.). Research Journal of Agricultural Sciences. 2015;6(1):232-234.
9. Zodape ST, Mukharjee S, Reddy MP, Chaudhary DR. Effect of *Kappaphycus alvarezii* (Doty) Doty ex silva. extract on grain quality, yield and some yield component of wheat (*Triticum aestivum* L.), Int. J Plant Prod. 2009;3:97-101.