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Influence of foliar application of nutrition in greengram (*Vigna radiata* L.) under sodic soil reclaimed with marine gypsum

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Abstract
Application of Marine gypsum and foliar nutrients in greengram (*Vigna radiata* L.) could be evaluated in Anbil Dharmalingam agricultural college and research institute during summer season in the year of 2021.Randomised block design was used in this experiment with 8 treatments. Foliar spray of 1% Mono potassium phosphate, Salicylic acid (100 ppm), Brassinosteriod (0.5 ppm) were given as combination at 30 DAS (Days after sowing) and 45 DAS including soil application with marine gypsum and without marine gypsum. Observation of growth attributes (plant height, number of branches, number of nodules and leaf area index) was observed at different growing periods. The results of the study reported that combined application of marine gypsum with 1% MKP + 100 ppm Salicylic acid + 0.5 ppm Brassino steroid to increased the plant height (56.57 cm), number of branches (3.57), number of nodules (11.00) and leaf area index (4.69) of green gram.

Keywords: Brassinosteroid, green gram, marine gypsum, mono potassium phosphate, salicylic acid

Introduction
Greengram is one of the important pulse crop which ranks third after pigeon pea and chickpea. It contains 20-25% protein. Hence, it contributes food to diabetic patients (Vishnu *et al*., 2010) [13]. Green gram cultivated throughout India but production and productivity was limited due to several factors such as soil and environmental factors (Pooja *et al*., 2010) [7]. Among soil factors, salinity and sodicity are major constraints. Accumulation of higher amount of sodium ions in soil increased soil pH, EC and SAR which leads to decreased the growth and development of the crop (Rasouli *et al*., 2013) [9]. Hence, reclamation process is necessary for rectifying this problem. Generally, broadcasting method of gypsum was practised (Deshmukh *et al*., 2014) [4]. During drainage, leached outs salts are accumulated in nearby field and consumed higher quantity of gypsum. Overcome this problem band placement method was used in this experiment. Band placement method facilitates leaching process in root zone area. In addition to this foliar spraying of nutrient (MKP) and growth regulators (Salicylic acid, Brassino steroid) easily and directly supplied nutrients to crop and also increased nutrient use efficiency and physiological function of the crop (Sruthi *et al*., 2020) [12]. Hence, the experiment was conducted to evaluate the foliar application of nutrients on growth and development of greengram under marine gypsum reclaimed sodic soil.

Materials and Methods
A field experiment was conducted during summer season of 2021 at Anbil Dharmalingam Agricultural College and Research Institute, using greengram (Vamban (Gg) 4).Seeds are sown in ridges and furrow with 30× 10 cm spacing. Research was carried in Randomised block design with three replication and 8 treatments under sodic soil condition (pH -7.5). The treatments consisted T_1- Marine gypsum, T_2- 1% MKP + 100 ppm Salicylic acid (FS), T_3- 1% MKP + 0.5 ppm Brassino steroid (FS), T_4-1% MKP + 100 ppm Salicylic acid + 0.5 ppm Brassino steroid (FS), T_5-Marine gypsum +1% MKP + 100 ppm Salicylic acid (FS), T_6-Marine gypsum +1% MKP + 0.5 ppm Brassino steroid (FS),T_7-Marine gypsum +1% MKP + 100 ppm Salicylic acid + 0.5 ppm Brassino steroid (FS),T_8-Control.Foliar spray of nutrient and plant growth regulators were given two stages (30 DAS and 45 DAS). Marine gypsum was band placed in slope of the ridge (one third from top of the ridge) at the time of sowing. Recommended dose of fertilizer (25: 50: 25 kg NPK per ha) was applied at basal. Irrigation was given at ten days interval.

Two hand weeding was done. Adequate plant protection measures were taken against sucking pest. In each replication, 5 plants were used for data collection and analysis of variance was used for statistical data analysis.

Results and Discussion

Plant Height

Plant height was significantly higher in Marine Gypsum +1% MKP + 100 ppm Salicylic acid + 0.5 ppm Brassino steroid (56.57cm) than control (Table 1). This was followed by marine gypsum with 1% MKP + 0.5 ppm Brassinosteroid (T_6) (52.98 cm) and marine gypsum with 1% MKP + 100 ppm salicylic acid (T_5) (52.93 cm) which on par with each other. A minimum plant height of 38.39 cm was observed in the control plot.

Application of marine gypsum decreased soil pH, increased ionic activity in the soil solution and decreased the uptake of Na by plants. Furthermore, exogenous application of nutrient and growth regulators maintained cell turgor pressure and accumulation of ABA, proline, cytokinin and IAA in plant tissues leads to expand the growth of the plant. Hence, soil reclaimed by marine gypsum with application of 1% MKP + 100 ppm Salicylic acid + 0.5 ppm Brassino steroid increased plant height of the green gram. These findings were similarly reported by Kaya *et al*. (2001) [5], Anikwe *et al*. (2016) [2] and Netwal *et al*. (2018) [6].

Table 1: Influence of foliar application of nutrition on plant height (cm) of greengram (*Vigna radiata* L.) under sodic soil reclaimed with marine gypsum

Treatments	30 DAS	45 DAS	Harvest
T_1 - Marine gypsum	13.76	26.01	49.32
T_2 - 1% MKP + 100ppm Salicylic acid (FS)	12.54	22.00	41.90
T_3 - 1% MKP + 0.5ppm Brassino steroid (FS)	12.66	24.02	41.83
T_4 - 1% MKP + 100ppm Salicylic acid (FS) + 0.5ppm Brassino steroid (FS)	13.30	24.05	45.92
T_5 - Marine gypsum + T_2	14.46	27.91	52.93
T_6 - Marine gypsum + T_3	15.30	28.02	52.98
T_7 - Marine gypsum + T_4	16.40	29.87	56.57
T_8 – Control	11.06	20.16	38.39
SEd	0.56	0.85	1.56
CD (P=0.5)	1.21	1.82	3.35

Number of branches

Marine gypsum +1% MKP + 100 ppm Salicylic acid + 0.5 ppm Brassino steroid significantly increased number of branches plant^{-1} (3.57) compared to control (Table 2.). This was statistically on par with marine gypsum with a foliar spray of 1% MKP + 0.5 ppm Brassinosteroid (3.55). A lesser number of branches plant^{-1} (2.09) was observed in control. Marine gypsum application reduces soil pH, EC and sodicity due to cation exchange capacity. In addition to this, application of MKP and PGR application provides nutrients such as phosphorus and potassium while also increasing the crop's photosynthetic rate. As a result, soil reclaimed by marine gypsum with 1% MKP + 100 ppm Salicylic acid + 0.5 ppm Brassino steroid application increased the number of branches plant^{-1} in green gram. These findings are in accordance with those reported by Rani *et al*. (2010) [8], Ali *et al*. (2013) [1] and Singh *et al*. (2014) [11].

Table 2: Influence of foliar application of nutrition on number of branches in greengram (*Vigna radiata* .L) under sodic soil reclaimed with marine gypsum

Treatments	30 DAS	45 DAS	Harvest
T_1 - Marine gypsum	2.14	2.00	3.03
T_2 - 1% MKP + 100ppm Salicylic acid (FS)	2.11	2.20	2.39
T_3 - 1% MKP + 0.5ppm Brassino steroid (FS)	2.10	2.53	2.41
T_4 - 1% MKP + 100ppm Salicylic acid (FS) + 0.5ppm Brassino steroid (FS)	2.13	2.26	2.70
T_5 - Marine gypsum + T_2	2.13	2.72	3.31
T_6 - Marine gypsum + T_3	2.17	2.97	3.55
T_7 - Marine gypsum + T_4	2.19	3.00	3.57
T_8 – Control	1.51	1.70	2.09
SEd	0.20	0.08	0.09
CD (P=0.5)	NS	0.17	0.21

Number of nodules

The use of marine gypsum +1% MKP + 100 ppm Salicylic acid + 0.5 ppm Brassino steroid resulted in a significantly higher number of nodules plant^{-1} (11.00) compared to the control (Table 3). This was followed by treatment T_6 (marine gypsum with combination of 1% MKP + 0.5 ppm Brassinosteroid) (10.13) and treatment T_5 (marine gypsum with combination of 1% MKP +100 ppm salicylic acid) (10.11). The lesser number of nodules plant^{-1} (6.67) was observed in control. Marine gypsum increased microbial activity and nitrogen availability in soil, whereas foliar spray of nutrition increased nitrogenase enzyme activity and rhizobium culture, allowing for greater root nodule production under soil. Hence, the combination of marine gypsum and foliar nutrition (1% MKP + 100 ppm Salicylic acid + 0.5 ppm Brassino steroid) improved the number of nodules plant^{-1} in green gram. Similar results were found by Yusuf *et al*. (2012) [14] and Sruthi *et al*. (2020) [12].

Table 3: Influence of foliar application of nutrition on number of nodules in greengram (*Vigna radiata* L.) under sodic soil reclaimed with marine gypsum

Treatments	30 DAS	45 DAS
T_1 - Marine gypsum	7.72	9.20
T_2 - 1% MKP + 100ppm Salicylic acid (FS)	6.00	7.53
T_3 - 1% MKP + 0.5ppm Brassino steroid (FS)	6.07	8.35
T_4 - 1% MKP + 100ppm Salicylic acid (FS) + 0.5ppm Brassino steroid (FS)	6.92	8.38
T_5 - Marine gypsum + T_2	8.50	10.11
T_6 - Marine gypsum + T_3	9.29	10.13
T_7 - Marine gypsum + T_4	9.32	11.00
T_8 – Control	5.10	6.67
SEd	0.31	0.37
CD (P=0.5)	0.77	0.80

Leaf area index

Significantly maximum LAI (4.69) was founded with application of Marine gypsum +1% MKP + 100 ppm Salicylic acid + 0.5 ppm Brassino steroid compared to control (Table 4.).This was on par with treatment T_6 (Marine gypsum + 1% MKP + 0.5 ppm Brassinosteroid) (4.68). The lowest LAI (2.77) was recorded in untreated control (T_8).Amelioration of sodic soil by marine gypsum increased the Physio chemical properties of the soil, which creates favourable conditions for crop growth. Furthermore, application of foliar nutrition improved uptake of nutrients and source-sink relationship led to production of more leaves, which consequently increased leaf area index. Hence, combined application of marine gypsum and foliar nutrition showed a higher leaf area index. This result is in accordance with those reported by Sengupta *et al*. (2011) [10] and Moura *et al*. (2018) [3].

Table 4: Influence of foliar application of nutrition on leaf area index in greengram (*Vigna radiata* L.) under sodic soil reclaimed with marine gypsum

Treatments	30 DAS	45 DAS	Harvest
T_1 - Marine gypsum	2.39	4.21	3.96
T_2 - 1% MKP + 100ppm Salicylic acid (FS)	1.98	3.39	3.10
T_3 - 1% MKP + 0.5ppm Brassino steroid (FS)	2.15	3.77	3.55
T_4 - 1% MKP + 100ppm Salicylic acid (FS) + 0.5ppm Brassino steroid (FS)	2.19	3.82	3.60
T_5 - Marine gypsum + T_2	2.64	4.58	4.37
T_6 - Marine gypsum + T_3	2.66	4.98	4.68
T_7 - Marine gypsum + T_4	2.84	5.00	4.69
T_8 – Control	1.77	3.02	2.77
SEd	0.07	0.17	0.14
CD (P=0.5)	0.15	0.34	0.30

Conclusion

A study reported that, sodic soil reclaimed with marine gypsum followed by combined foliar application of nutrients (1% MKP) and growth regulators (100 ppm Salicylic acid + 0.5 ppm Brassino steroid) improved plant height, number of branches, number of nodules and leaf area index.

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References

1. Ali EA, Mahmoud AM. Effect of foliar spray by different salicylic acid and zinc concentrations on seed yield and yield components of mungbean in sandy soil. Asian Journal of FCrop Science 2013;5(1):33-40.
2. Anikwe MAN, Eze JC, Ibudialo AN. Influence of lime and gypsum application on soil properties and yield of cassava (*Manihot esculenta Crantz*.) in a degraded Ultisol in Agbani, Enugu Southeastern Nigeria. Soil and Tillage Research 2016;158:32-38.
3. De Moura EG, Portela SB, Macedo VR, Sena VGL, Sousa CCM and Aguiar A. Gypsum and legume residue as a strategy to improve soil conditions in sustainability of agrosystems of the humid tropics. Sustainability 2018;10(4):1006.
4. Deshmukh K. Effect of gypsum on the chemistry of saline-sodic soils of sangamner Area, Ahmednagar District, Maharashtra, India. In *Athens:* ATINER'S Conference Paper Series, No: ENV2014-1197. 2014.
5. Kaya C, Kirnak H, Higgs D. Enhancement of growth and normal growth parameters by foliar application of potassium and phosphorus in tomato cultivars grown at high (NaCl) salinity. Journal of Plant Nutrition 2001;24(2):357-367.
6. Netwal M, Choudhary MR, Jakhar R, Devi S, Choudhary S. Exogenous application of brassinoide and salicylic acid enhances on growth, yield and nutritional quality of Indian bean (*Lablab purpureus* L. *var. typicus*). Journal of Pharmacognosy and Phytochemistry 2018;7(6):2093-2096.
7. Pooja AP, Ameena M. Nutrient and PGR based foliar feeding for Yield Maximization in pulses: Agricultural Reviews. 10.18805/ag.R-2056 2020.
8. Rani PS. Effect of brassinosteroids on of greengram crop (*Vigna radiata* L.). International Journal of Plant Sciences (Muzaffarnagar) 2010;5(1):118-121.
9. Rasouli F, Pouya AK, Karimian N. Wheat yield and physico-chemical properties of a sodic soil from semi-arid area of Iran as affected by applied gypsum. Geoderma 2013;193:246-255.
10. Sengupta K, Banik NC, Bhui S, Mitra S. Effect of brassinolide on growth and yield of summer green gram

crop. Journal of Crop and Weed 2011;7(2):152-154.
11. Singh A, Singh JK. Effect of gypsum on the reclamation and soil chemical properties in sodic soils of Raebareli District, Uttar Pradesh. International Journal of Scientific Research in Environmental Sciences 2014;2(12):429.
12. Sruthi D, Singh S, Tiwari D, Kavya P. Effect of foliar spray of nutrient and plant growth regulators on growth and yield of green gram (*Vigna radiata* L.).The Bioscan 2020;15(2):253-256
13. Vishnu K, Brar BS. Role of plant growth regulators in pulse production: A. IJC International Journal of Chemical Studies 2020;8(5):2736-2742.
14. Yusuf M, Fariduddin Q, Ahmad A. 24-Epibrassinolide modulates growth, nodulation, antioxidant system, and osmolyte in tolerant and sensitive varieties of Vigna radiata under different levels of nickel: a shotgun approach. Plant physiology and biochemistry 2012;57:143-153.