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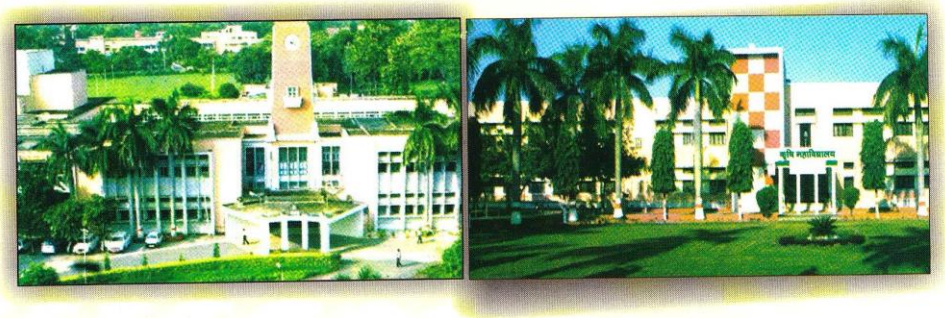

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Ma., J. F. 1990. Studies on beneficial effects of silicon on rice plants. Ph.D. Thesis, Kyoto University.

Ma, J.F., Takahashi, E., 2002. Soil, Fertilizer and Plant Silicon Research in Japan. Elsevier, Amsterdam

Savant, N. K., Snyder, G. H., and Datnoff, L. E. 1997. Silicon management and sustainable rice production, pp. 151-199. In: Adv. Agron., Vol. 58 (ed. by D. L. Sparks) Academic Press, San Diego, CA, USA.

Seyfferth, A.L., Kocar, B.D., Lee, J.A., Fendorf, S., 2013. Seasonal dynamics of dissolved silicon in a rice cropping system after straw incorporation. Geochem. Cosmochim. Acta 123, 120–133.

Singh, V.P., Tripathi, D.K., Kumar, D., Chauhan, D.K., 2011. Influence of exogenous silicon addition on aluminium tolerance in rice seedlings. Biol. Trace Elem. Res 144, 1260–1274..

Van Bockhaven, J., De Vleesschauwer, D., Hofte, M., 2013. Towards establishing broad-spectrum disease resistance in plants: silicon leads the way. J. Exp. Bot. 64, 1281–1293.

Yamamoto, T., Nakamura, A., Iwai, H., Ishii, T., Ma, J.F., 2012. Effect of silicon deficiency on secondary cell wall synthesis in rice leaf. J. Plant Res. 125, 771–779.

Ye, M., Song, Y., Long, J., Wang, R., Baerson, S.R., Pan, Z., Zhu-Salzman, K., Xie, J., Cai, K., Luo, S., Zeng, R., 2013. Priming of jasmonate-mediated antiherbivore defense responses in rice by silicon. Proc. Natl. Acad. Sci. U. S. A. 110, 3631–3639.

Zeng, F., Zhao, F., Qiu, B., Ouyang, Y., Wu, F., Zhang, G., 2011. Alleviation of chromium toxicity by silicon addition in rice plants. Agric. Sci. China 10, 1188–1196.

Influence of Sowing Methods and Weed Control on Yield and Economics of Direct Seeded Rice under *Konkan* Region

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An experiment was conducted at Agronomy Farm of Dr. B.S.K.K.V., Dapoli during *kharif* season 2013 to study the "Influence of sowing methods and weed control on yield and economics of direct seeded rice under *Konkan* region". The result revealed that sowing methods drilling (S_2) and drum seedling (S_3) which were at par with each other and significantly influenced grain and straw yield, total cost of cultivation, gross income, net returns and B:C ratio over broadcasting (S_1). The methods of weed control treatment W_2 weed free (H.W. at 20, 40, 60 DAS) followed by treatment W_7 (PE *Oxydiargyl* @ 120 g ha^{-1} + PoE *Bispyribac sodium* @ 25 g h^{-1}) which were at par with each other and found significantly superior over rest of the treatments. Treatments W_6 (PoE *Bispyribac sodium* @ 25 g ha^{-1}+ One hoeing (40 DAS), W_5 (PE *Oxadiargyl* @ 120 g ha^{-1} + One hoeing (40 DAS), W_4 (PoE *Bispyribac sodium* @ 25 g ha^{-1}) and W_3 (PE *Oxadiargyl*@120 g ha^{-1}) were at par with each other but found significantly superior over treatment W_1 (Unweeded check) in respect of grain and straw yield, total cost cultivation and gross income. Highest net return and B: C ratio (1.37) recorded under the treatment W_7. It can be concluded that direct seeded rice should be sown by drilling method with hand weeding thrice (20, 40 and 60 DAS) for obtaining higher grain and straw yield. However under the scarcity of labourers application of pre emergence (*Oxadiargyl* @120 g ha^{-1}) and post emergence(*Bispyribac sodium* @25 g ha^{-1}) herbicide for drilled rice gave higher net returns, B: C ratio.

(Key words: *Rice, Sowing methods, Weed management, Yield, Economics, Oxadiargyl, Bispyribac sodium)*

Enhancing productivity and profitability of rainfed wheat with thiourea and dew harvesting in North-western Himalayas

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Wheat (*Triticum aestivum L*) is the most important *rabi* (winter) season crop in the North-western Himalayas. It is mostly grown under rainfed conditions because only 10% of the cultivated area in Uttarakhand hills has assured irrigation. The wheat crop is mostly grown with conserved soil moisture after harvesting of the preceding *kharif* season crops. The monsoon rains also recedes before sowing of the wheat crop leaving very less soil moisture. The low soil moisture at the time of sowing of wheat results in very poor germination and sub-optimal crop stand. The terminal heat coupled with soil moisture deficiency during the reproductive stage of wheat adversely affects the grain yield (Khokhar *et al.*, 2016). The pre-conditioning of seeds may improve the seed vigour, thereby, enhancing the germination and optimum plant stand (Meena *et al.*, 2014).Improvement in plant growth and development due to application of thiourea has been reported in crops grown in arid and semi-arid regions. Thiourea application enhances canopy photosysnthesis and metabolic transport of photosynthetic assimilates to grains via an effect of phloem loading and is reported to be effective in enhancing the wheat productivity under adverse environmental conditions (Sahu and Singh, 1995).After monsoon the humidity remains quite high in the atmosphere during night time, when temperature falls down sharply, which results into formation of more water molecules from vapour. They fall on soil surface in the form of dew as they are heavier. They make the soil layer

moist and wet, which can be utilized for the sowing of *rabi* crops. Keeping above points in view, a field experiment was conducted to evaluate the effect of thiourea and dew harvesting on productivity and profitability of rainfed wheat.

MATERIALS AND METHODS

The field experiment was conducted during 2012-13 to 2016-17 at the Experimental Farm of ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora, India. The site is located at 29° 36´ N latitude and 79° 40´ E longitude at an elevation of 1,250 m amsl. The soil of the experimental site was sandy loam with pH 6.3, having low level of available nitrogen (166.8 kg N/ha), medium level of available phosphorus (20.5 kg P_2O_5/ha) and potash (188.3 kg K_2O/ha).The experiment comprised of six treatments viz. control (T_1), seed soaking with 1000 ppm thiourea solution (T_2), spray at tillering &booting stage with 1000 ppm thiourea solution (T_3), seed soaking with 1000 ppm thiourea solution + spray at tillering & booting stage with 1000 ppm thiourea solution (T_4), seed soaking with 1000 ppm thiourea solution) + farmyard manure (FYM) packing + dew harvesting (T_5) and deep sowing of seeds soaked with 1000 ppm thiourea solution (T_6). The experiment was laid out in randomized block design with four replications. The crop was sown in rows 22.5 cm apart using 100 kg seed per ha.The wheat seed wassoaked for 6 hours with 1000 ppm solution ofthiourea as per the treatment followed by drying in shade. Thefoliar sprays of thiourea were done at the time of tillering and booting stages of the crop using spray volume of 375 liters/ha.The other agronomic practices were followed as per the recommendation.

RESULTS AND DISCUSSION

Under rainfed condition, highest mean wheat grain yield (3067 kg/ha) was recorded under the treatment comprising of seed soaking with 1000 ppm thiourea solution + FYM packing + dew harvesting (T_5),which was 10.7%higher than control (2771 kg/ha) and was closely followed by the treatment of seed soaking + two sprays at tillering and booting stages with 1000 ppm thiourea solution (3017 kg/ha) (T_4)(3017 kg/ha) (Table 1). Out of five years of experimentation, T_5 provided highest wheat grain yield for four years while during 2012-13, T_4 was the best treatment.Seed soaking with 1000 ppm thiourea solution alone (T_2)improved yield by 2.5 per cent, which further increased by 4.9% with two sprays at tillering and booting stages (T_3)over the control. Combined effect of seed soaking and spray (T_4) increased the yield upto 8.9% cent compared to control. The deep sowing of seed soaked with 1000 ppm thiourea solution (T_6)recorded yield almost similar to T_2 and T_3.The thiourea application might have favoured the greatertranslocation of assimilates from source to sink for longerperiod in comparison with control treatment which lead toeffective grain filling.Sowing the thiourea soaked seed in dew harvested plot and covering with FYM in the morning might have improved the seed vigour and helped the plants to establish well. Khokhar *et al.* (2016) also reported similar results with the application of 1000 ppm thiourea solution in rainfed wheat.

An account of economic analysis (mean of 5 years) such as cost of cultivation, gross returns, net returns and benefit-cost ratio for different treatments has been depicted in Fig 1. Though the cost of cultivation was 5.5%higher in T_4 compared to the control plot but the gross and net returns were 8.9 and 11.9% more with the former treatment compared to control, respectively. The B:C ratio was also highest (2.14) when thiourea was used as seed soaking + spray (T_4). Higher gross returns, net returns and B:C ratio with use of thiourea were due to proportionately less increase in their cost of cultivation and more increase in grain and straw yields. Although seed soaking with 1000 ppm thiourea solution + FYM packing + dew harvesting (T_5) recorded highest gross returns but due to higher cost involved in the treatment, the B:C ratio was even lower than the control. Singh and Rathore (2003) also reported better returns with the use of thiourea.

REFERENCES

Khokhar, A.K.; Singh, Satvinder; Kumar, Vijay; Sharma, S.C.; Bawa, S.S.; Sher Singh; Sharma, Vivek and Singh, Manmohanjeet. 2016. Seed priming and foliar spray of thiourea for improving growth and productivity of rainfed wheat in Kandi region of Punjab. *The Bioscan***11**(3): 1693-96.

Meena, V.K.; Kaushik, M.K.; Meena, R.S.; Meena, V.S. amd Meena, B.P. 2014. Effect of growth regulators on clusterbean [Cyamopsis tetragonoloba (L.)] growth under Aravali hills environment in Rajashtan. *The Bioscan***9**(2): 547-550.

Sahu, M.P. and Singh, D. 1995. Role of thiourea in improving productivity of wheat (Triticum aestivum L.). *Plant Growth Regulation***14**(4): 169-178.

Sher Singh and Rathore, P.S. 2003. Influence of phosphorus and thiourea on yield and economics of greengram [Vigna radiata var. aureus (L.) Wilczek]. *Research on Crops***4**(2): 210-212.

Table 1: Wheat grain yield under different treatments

Treatment	2012-13	2013-14	2014-15	2015-16	2016-17	Mean
T_1 : Control	3918	4605	3640	955	735	2771
T_2 : Seed soaking (1000 ppm)	3977	4658	3720	1040	806	2840
T_3 : : Spray at Tillering & Booting stage (1000 ppm)	4120	4749	3767	1067	829	2906
T_4 : Seed soaking + Spray at Tillering & Booting stage (1000 ppm)	4210	4916	3956	1118	885	3017
T_5 : Seed soaking (1000 ppm thiourea solution) + FYM packing + Dew harvesting	4169	5010	4001	1212	942	3067
T_6 : Deep sowing of seeds soaked in 1000 ppm thiourea solution	4070	4808	3740	1062	822	2900
Mean	4077	4791	3804	1076	836	2917
SEm±	253	210	212	52	43	
CD (P=0.05)	NS	NS	NS	NS	NS	

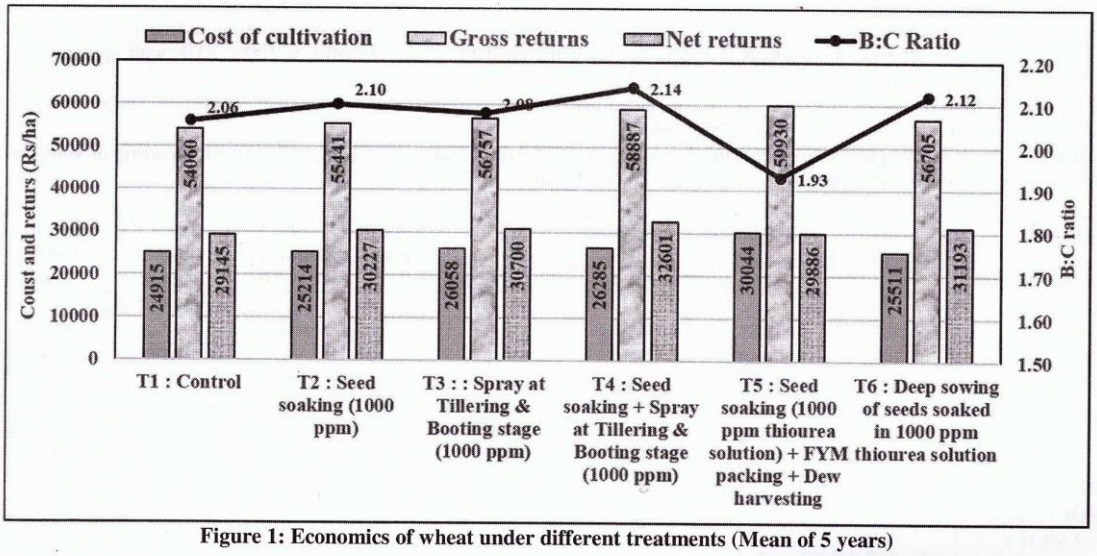

Figure 1: Economics of wheat under different treatments (Mean of 5 years)

EFFECT OF SEAWEED (KAPPAPHYCUS ALVAREZII) SAP ON WHEAT YIELD AND SOIL HEALTH

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Excessive application of chemical fertilizers may affect soil health and sustainable productivity. In this situation seaweed is a better option as a nutrient supplement.Seaweed extract is a new generation natural organic fertilizer containing highly effective nutrients plant hormones, and many other beneficial compounds, which promotes growth and yield of crops as well as it enhances the resistant ability to biotic and abiotic stresses.

Materials and Methods

Present investigation was undertaken at Birsa Agricultural University, farm, Kanke, Ranchi, Jharkhand, India, during *Rabi* season of 2013-15 on sandy-loam soil , moderately acidic in nature (pH 5.5), having low organic carbon (0.30 %), low in available nitrogen (175.6 kg ha^{-1}), high in available phosphorus (26.8 kg ha^{-1}) and medium in exchangeable potassium (171.3 kg ha^{-1}), with aim to evaluate biological agent for plant health & growth. The experiment was laid out in a randomized block desoign (RBD) with 12 treatments, replicated thrice. Treatment consists of 6 concentration of seaweed extract. (0.0, 2.5, 5.0, 7.5, 10.0 and 15.0%) and sprayed on the foliage of wheat as per treatment, thrice at 25 (CRI), 45 (maximum tillering) and 65 DAS (boot stage) in combination with 50 and 100% recommended dose of fertilizer (120:60:40 kg N:P_2O_5:K_2O ha^{-1}).Crop was fertilized as per treatment through urea, diammonium phosphate (DAP) and muriate of potash (MOP). Half of nitrogen, full dose of phosphorus and potassium was applied as basal and rest of nitrogen was top dressed equally in two splits at crown root initiation and maximum tillering stage.

Result and discussion

Seaweed sap concentration and fertilizer level significantly influenced the grain and straw yield of wheat. Crop fertilized with 100% recommended dose of fertilizer (RDF) and sprayed with 7.5% K sap caused significantly higher grain (45.4 q ha^{-1}), straw yield, N, P & K uptake by crop plants (78.7 q ha^{-1}), compared to rest of the combinations of sap concentration either with 100 or 50%RDF, except 5%. Yield increased with increasing concentration sap up to 7.5 %, thereafter it gradually declined with both the levels of fertilizer. The magnitude of increase in grain and straw yield with 100% RDF was 119.47 and 129.01% over control (100% RDF with water spray) respectively. Similar trend was observed with 50% RDF.Crop sprayed with 7.5% K sap at 50% RDF produced as high grain (36.3 q ha^{-1}) and straw yield (60.5 q ha^{-1}) as control (100% RDF with water spray). Enhancement in yield may be due to the fact that seaweed extract is a bio-stimulant which provides micro-macro nutrients and significant amount of cytokinines, auxins and betains to the plant which ultimately increases chlorophyll content to boost up the photosynthetic process and translocation of assimilates to the point of grain sets thereby stimulating vegetative as well as reproductive growth and consequently enhanced productivity (Pramanick *et.al.*,2014)

Total nitrogen uptake was increased by 164.63% over control and corresponding increase was 156.66% P and 164.63% K.Curtailment of 50% recommended dose of nutrient along with 7.5% K sap recorded similar N,P and K uptake as 100% RDF with water spray. Nutrient uptake increased due to presence of natural chelating compounds in sap that have increased nutrient availability by a better absorption of the chelated compound at leaf level as reported by Salat (2004), because it increased root proliferation and establishment thereby plants were able to mine more nutrients even from distant places and deeper soil horizon in balanced proportion.