International Journal of Fauna and Biological Studies
Available online at www.faunajournal.com

IJFBS International Journal of Fauna And Biological Studies

E-ISSN: 2347-2677
P-ISSN: 2394-0522
IJFBS 2018; 5(1): 157-158
Received: 18-11-2017
Accepted: 19-12-2017

Kamal Kant Lodhi
Senior Technical Assistant
NFSM, SAMETI, Raipur,
Chhattisgarh, Punjab, India

Uttam Kumar Diwan
Deptt. of Agrometeorology,
IGKV, Raipur, Chhattisgarh,
Punjab, India

Correspondence
Kamal Kant Lodhi
Senior Technical Assistant
NFSM, SAMETI, Raipur,
Chhattisgarh, Punjab, India

Short Note

Effect of natural organic fertilizer (seaweed saps) on productivity and protein status of soybean

Kamal Kant Lodhi and Uttam Kumar Diwan

Introduction

Marine algal seaweed species are often regarded as an underutilized bio resource; many have been used as a source of food, industrial raw materials and in therapeutic and botanical applications for centuries. Seaweed extracts contain major and minor nutrients, amino acids, vitamins, cytokinins, auxin and abscisic acid like growth promoting substances and have been reported to stimulate the growth and yield of plants, develop tolerance to environmental stress (Zhang *et al*., 2003) [9], increase nutrient uptake from soil (Turan and Kose, 2004) [7] and enhance antioxidant properties (Verkleij, 1992) [8]. In recent years, the use of seaweed extracts have gained in popularity due to their potential use in organic and sustainable agriculture (Russo and Beryln, 1990) [6], especially in rainfed crops, as a means to avoid excessive fertilizer applications and to improve mineral absorption. Unlike chemical fertilizers, extracts derived from seaweeds are biodegradable, nontoxic, non-polluting and non-hazardous to humans, animals and birds (Dhargalkar and Pereira, 2005) [2]. Moreover, seaweed and seaweed-derived products have been widely used as amendments in crop production systems due to the presence of a number of plant growth-stimulating compounds.

Soybeans are by far the most popular oilseed crop produced in the world today. Soybeans represent 55% of the total global production of oilseeds followed by rapeseed (14%), cottonseed (10%), peanut (8%), sunflower (9%), palm kernel (3%) and copra (1%). Soya Milk is an inexpensive and remarkably versatile high protein food made from soyabeans. It is a white liquid made from the seed. Unlike most other protein foods, milk is entirely free from cholesterol and low in fat (specially saturated fats). The quality of protein is as high as that found in chicken. It is also good for dieters as this contain low calories. It is an excellent food for babies, children, elderly people and pregnant and lactating women since it contains vegetable protein which is very nutritious and easy to digest. Soya milk and its derivatives are the cheapest source of protein, its derivatives tofu (soya paneer) makes testy dishes like matar paneer, palak paneer etc. and snacks like soya burger, patties, sand witches, pakoras etc. and also used in desserts. As the taste of commercial soy milk improves more and more people are drinking it as enjoyment. But many people drink soy milk for the added health benefits. So what are the benefits of drinking soy milk as compared to cow's milk? Soy milk contains only vegetables proteins, Vegetable proteins have the advantage that they cause less loss of calcium through the kidneys. Soy milk contains no lactose, Soy milk reduces cholesterol, Soy milk contains no hormones, Soy milk does not cause insulin dependent diabetes and Soy milk is rich in isoflavones.

Materials and Methods

Field experiment was carried out during *Kharif* season of 2013 at Research cum Instructional Farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) for evaluating productivity and protein status of soybean with the application of seaweed saps.

The experiment comprised of ten treatments. Two sprays of *Kappaphycus* and *Gracilaria* extract were applied at different growth stages after 25, 50 and 75 DAS. Spraying of sea weed sap was done in the field as per the treatment. First spraying was done after 25 DAS on July 17, 2013; second spray was done at 50 DAS on August 11, and last spray was done at 75 DAS on 4 September 2013 through knapsack sprayer. The quantity of water used was 500-600 liter

ha^{-1} with adjuvant. The soil of experiment field was '*Vertisol*' (Clay) which is locally known as '*Kanhar*' with pH 7.4, EC 0.28 dsm^{-1}, Organic carbon 0.44%, Available N 200.7 kg/ha, P 40 kg/ha and K 329.28 kg/ha. The recommended nutrient dose of Nitrogen, Phosphorus, Potassium and Sulphur was applied @ 20:60:40:20 Kg/ha for the soybean crop. The total N content in seed was determined by Kjeldhal method. The protein content in soybean grain was estimated by multiplying the N content in grain of soybean by 5.71 (Merrill and Watt, 1973) [4].

Results and Discussion

Seaweed sap of *kapaphycus spp.* and *gracilaria spp.* along with RDF showed the significant effect on dry matter, test weight, yield, N content, protein content and protein yield (Table 1). Dry matter accumulation (g) $plant^{-1}$ was found significantly higher i.e. 40.32 g under foliar spray of 15% K Sap + RDF (T_4), however, it was found statistically at par with foliar spray of 5% K Sap + RDF (T_2), 10% K Sap + RDF (T_3), 10% G Sap + RDF (T_7) and 15% G Sap + RDF (T_8). 100 seed wt. (g) was also found significantly maximum i.e. 10.37 g under foliar spray of 15% K Sap + RDF (T_4) which was found at par with foliar spray of 10% K Sap + RDF (T_3), 10% G Sap + RDF (T_7) and 15% G Sap + RDF (T_8). Seed yield (kg ha^{-1}) was found significantly maximum i.e. 2510 kg ha^{-1} under foliar spray of 15% K Sap + RDF (T_4) which was found at par with foliar spray of 10% K Sap + RDF (T_3), 10% G Sap + RDF (T_7) and 15% G Sap + RDF (T_8). Data pertaining to N content and protein content found significantly higher under foliar spray of 15% K Sap + RDF (T_4) which was found at par with 5% K Sap + RDF (T_2), 10% K Sap + RDF (T_3), 10% G Sap + RDF (T_7) and 15% G Sap + RDF (T_8). However protein yield, was also found higher under maximum yield producing treatment i.e. foliar spray of 15% K Sap + RDF (T_4), which was at par with 15% G Sap + RDF (T_8). Growth hormones like cytokinin and gibberellins along with other trace element have been detected in the extract of *Kappaphycus spp.* and *Gracilaria spp.* which might be responsible for beneficial effects in the present study. Rathore *et al*. (2009) [5] observed that the highest grain yield was recorded with applications of 15% seaweed extract, followed by 12.5% seaweed extract that resulted in 57% and 46% increases respectively compared to the control. Bahu and Rengasamy (2012) [1] also find that protein content was increased with the application seaweed sap on different crop due to growth hormones and micronutrient present in seaweed sap.

Table 1: Effect of seaweed sap on dry matter, yield, N content, protein content and protein yield of soybean.

Treatment	Dry matter accumulation (g) $plant^{-1}$	100 – seed weight (g)	Seed yield (kg/ha)	N content in Seed (%)	Protein content (%)	Protein yield (kg/ha)
T_1: 2.5% K Sap + RDF	30.34	9.45	1729	5.24	32.77	564.26
T_2: 5% K Sap + RDF	33.53	9.66	1930	5.43	33.92	654.39
T_3: 10% K Sap + RDF	35.17	9.81	2192	5.45	34.04	746.24
T_4: 15% K Sap + RDF	40.32	10.37	2510	5.62	35.13	881.30
T_5: 2.5% G Sap + RDF	30.42	9.41	1712	5.21	32.58	559.63
T_6: 5% G Sap + RDF	32.25	9.64	1926	5.30	33.13	636.06
T_7: 10% G Sap + RDF	33.53	9.78	2164	5.43	33.96	734.37
T_8: 15% G Sap + RDF	39.35	10.29	2430	5.51	34.46	835.98
T_9: Water Spray+ RDF	29.53	9.22	1586	5.20	32.52	515.94
T_{10}: 7.5 % K SAP+50% RDF	28.92	9.32	1693	5.12	32.02	543.57
SEm±	2.3	0.2	123.2	0.08	0.56	36.83
CD (P=0.05)	7.0	0.6	366.0	0.26	1.66	109.44

Reference

1. Bahu S, Rengasamy R. Effect of *Kapphaphycus alvarezii* SLF treatment on seed germination, growth and development of seedling in some crop plant. J. Acad. Indus. Res. 2012; 1(4):186-195
2. Dhargalkar VK, Pereira N. Seaweed: promising plant of the millennium. Science and Culture, 2005; 71:60-66.
3. http://www.soya.be/benefits-soy-milk.php
4. Merrill AL, Watt BK. Energy Value of Foods, Basis and Derivation (Revision). Agric. Handbook No. 74. US Department of Agriculture, Washington, DC, 1973.
5. Rathore SS, Chaudhary DR, Boricha GN, Ghosh A, Bhatt BP, Zodape ST *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(2):351-355.
6. Russo RO, Beryln GP. The use of organic biostimulants to help low inputs. Journal of Sustainable Agriculture. 1990; 1:9-42.
7. Turan M, Kose C. Seaweed extracts improve copper uptake of grapevine. ACTA Agriculture Scandinavica Section B-Soil and Plant Science. 2004; 54:213-220.
8. Verkleij FN. Seaweed extracts in agriculture and horticulture: a review. Biological Agriculture and Horticulture, 1992; 8:309-324.
9. 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.