ESTERIFIED CONDITIONER AND REPAIRING AGENT FOR SALINITY AFFECTED AGRICULTURAL SOIL OF INDIA

Abstract:

Various bio-conversion reactions given by lipases such as hydrolysis, transesterification, esterification, alcohoysis, acidolysis and aminolysis. The potential esterification process in soil plays important role not only as a fertilizer or nutrient but also act as a modulator to alter the conditions of soil and help in uptake of nutrient and minerals. This potential formulation accumulates micro-nutrients and mineral that promotes growth of plants. The trials of vegetable plants and grains shown significant increase in crop yield per hector area. The bulk density and field capacity of the soil are also significantly change and act as soil conditioner also influence the growth of plants. The micronutrients uptake of plant helps optimize the soil pH and improve the soil conditions. The inventors of present invention tested formulation as plant growth promoters that enhance crop characteristics like panicle length, plant height, grain or fruit yield and add to nutrient value of the crop. Our product is fatty acid composite which play crucial role as plant growth promoter along with reducing seed germination time and increasing plant crop yield, it also beneficial to work under water stress conditions and variant geo-climatic conditions.

Keywords: bio-conversion, fertilizer, soil conditioner, geo-climate condition, crop yield.

Introduction:

A characteristic of saline soil from an agricultural point of view is that it contains enough neutral dissolved salts to adversely affect the growth of most crop plants. For definition purposes, those saline soils with soil saturation elicit an electrical conductivity greater than 4 dS/m at 25°C (Richards 1954). This value is generally used worldwide, although the terminology committee of the Soil Science Society of America has reduced the boundary between saline and non-saline soils to 2 dS/m in extract saturation.

High amount of salt present in soil makes the crop poor in nutritive values and uneven morphological growth and low yield that depending on the degree of salinity (Garlapati, V.K.; Banerjee, R., 2013). The main effect of excess salinity is that it

provides less water to the plants, although that accumulated in root zone. This is because the osmotic pressure of the soil solution increases as the salt concentration increases. In addition to the osmotic effect of salts in the soil solution, the excess is removed and the absorption of certain substances harms plants and/or slows the absorption of other essential plant nutrients (Hoffman *et al*, 1983). Fertilizer in the form of microcapsulates, microparticles or granulated with silica can controlled release of micronutrients into the surrounding environment and can reduce the washout effect so that total amount of nutrients can be reduced (John and John, 1995). The addition of the encapsulated material can be used to improve or increase plant characteristics such as fruit yield, nutrient uptake, emergence, plant vigour index, leaf mass, cultivars stronger and better, pigmentation, protein production, photosynthetic activity, early flowering, early fruit development, early grain development, increased shoot growth, improves water stress and increases plant resistance in a small application of the composition with selection of fertilizers, amino acids and micronutrients (Pereira, A. G, 2000). By analogy, the term "increase the yield" of an agricultural plant means that the yield of a product of each plant increases to a greater extent than the yield of the same product of the plant produced under the same conditions, but without the use of the agricultural composition of the new material. Esterification is a new target for cereal biofortification since esterification increases both accumulation and stability of carotenoids (Chandel et al, 2011). According to an analogy, the term "increased nutrient uptake" means to improve ion uptake, plant metabolism to increase the nutritional value of fruits or vegetables. Fruits or vegetables contain nutrients such as minerals, proteins, vitamins, carbohydrates, etc. The present invention can be used to reduce plant stress such as salt stress, drought stress, heat stress, cold stress, salt stress, micronutrient stress and together with other biotic and abiotic stresses of the plant.

Materials and methods:

Materials: Ascorbyl palmitate ($C_{22}H_{38}O_7$) (Merck) which is ester formed from ascorbic acid and palmitic acid, fat-soluble ascorbic acid. It’s also act as antioxidants. Ethylene glycol distearate ($C_{38}H_{74}O_4$) (Merck) is act as emulsion stabilizer. It is the

diester of stearic acid and ethylene glycol which is a naturally occurring fatty acid. All chemicals are commercially available.

Preparation of esterified conditioner:

Ethylene Glycol distearate mix with ascorbyl palmitate at 40°C then mixing with continuous stirring with alcohol ethoxylates up to 75°C and after mixing cooling it 15-40°C. 1M ascorbic acid mix with 2.5 M palmitic acid and celite-bound lipase, mix it well and stir it gradually increase temperature upto 75°C.Celite-immobilized commercial lipase dissolved in dimethylsulfoxide (DMSO) and mix immobilized lipase onto celite matrix and subsequent exposed to 1% glutaraldehyde showed 75% binding of protein. Celite bound lipase optimum 75°C and pH 8.5 under shaking condition and showed maximum hydrolytic activity towards phosphate attenuated substrate. Some Others chemicals can also be used for the preparation. In place of Ethylene Glycerol distearate other technical chemicals like PEG-6000, PEG-2000, glycerol dioleate, glycerol monostearate, sorbitain tris tearate can be use.In place of ascorbyl palmitate other chemicals like PEG-150, custor oil, olive oil, polysorbate 80, salicylic acid can be use. Alcohol ethoxylates can be replace by tridecyl alcohol, isopropyl palmitate, isopropyl myristate, dimethiocone.

Field trials: The effect of new formulated product studied by measuring soil macro and micro nutrients concentration. Seasonal crops has been selected for field study, plot was sandy loamy in texture, nearly neutral pH. With control plot is also studied during entirely seasons and all various crops.

Result and discussion:

A possible explanation for the product is that the rate of oxidation of the very-long-chain of fatty acids is much slower than that of the medium-chain-length of other carbon sources. Therefore, the first stable intermediate in very-long-chain oxidation (namely the alcohol) undergoes oxidative degradation as soon as it is formed. If such be the case, dilution of the alcohol pool might be accomplished by soil geochemical reactions with readily oxidizable C_{16} to C_{22}, ester fraction after co-oxidation indicates that in spite of the dilution of the alcohol pool that must have occurred as a result of the co-oxidation, the C_n alcohol underwent preferential oxidation, which leads to increase crop yield and germination by channelizing metabolic cycles of the plants.

Trials has been taken on vegetables like onion;toor, grains like millet; juvar and on cotton.

Table-1: Comparison of Physico-chemical analysis of soil with product and control soil

	Okra		Toor		Cotton		Millet		Juvar		Wheat	
	W/O	WITH	W/O	WITH	W/O	W/O	W/O	WITH	W/O	WITH	W/O	WITH
pH	7.9	7.4	7.4	7.1	7.9	7.9	7.8	7.7	7.9	7.8	7.5	7.1
Cond.	0.40	0.65	0.94	0.34	0.186	0.186	0.964	0.734	0.186	0.166	0.80	0.42
TOC (gm%)	0.13	0.08	0.17	0.12	0.5	0.5	0.6	0.7	0.5	0.6	0.52	0.66
P (ppm)	17.26	28.0	25.23	46.65	0.8	0.8	0.27	2.2	0.8	2.16	0.45	1.23
K(ppm)	48.0	82.34	25.3	80.5	52.6	52.6	72.5	154.8	52.6	180.4	23.5	52.4
Micro-nutrients												
Fe (ppm)	7.0	7.4	5.00	12.5	8.4	8.4	14.0	40.0	8.4	25.9	7.2	12.8
Zn (ppm)	0.5	1.0	1.5	2.5	0.3	0.3	0.7	0.9	0.3	0.8	0.3	0.9
Mn (ppm)	4.74	2.96	1.95	2.80	7.45	7.89	8.09	8.17	7.0	7.11	2.5	3.0

Table-2: Crop Yield per hector

Crop/Application(Per Hactar)	Okra kg/ha	Toor kg/ha	Cotton kg/ha	Millet kg/ha	Juvar kg/ha	Wheatkg/ha
With new formulated conditioner	8100	1565	2915	4400	3500	4370
Without conditioner	6100	1060	2010	2975	2250	3050

A xanthophyll acyl transfereases is responsible for carotenoid esterification in the endosperm of wheat and related cereals, which shows more than 60-70% increase in crop yield. During this soil condition is also improved that indicates accumulation of micronutrients and channelized within plant growth promotion. With addition formulated product, crop yied and soil condition is improved because its natural “Bio” product that “bio” esters with organic solvent. The most active enzyme during the process may be highly involved in esterification and in the presence of water natural flavour esters was accompany the organic solvents. This longer chain esters may infolved in both processes water system maintaining

a constant water level and water activity in the reaction mixture. During the high degree of esterification calcium, potassium, zinc is linked with glycans and helpful to plants for activation of various growth hormones. Okara with formulated conditioner shows more than 100% crop yield production, meanwhile in some cases increase in 200% percentage. This shows high impact of esterification on crop production.

Conclusion:

Esters are highly active and diversify that possess the multifunctional anion and sufracnts as well. The significant combine use of multifunctional properties of esters depends on its raw material, emlisifer agents degree of esterification and alcohol according to range of esters can be synthesized. Because of this unique and additional properties esters become more useful in agricultural practices. Our work has shown, the present product application that it has significant effects on lipids during seed germination along with draft management at both neutral to alkaline soils of India. Crop yield has been increase in range of 30-45% during *de novo* studies. It has been studied that pH of the soil and micronutrient level are significantly correlated to major crops. Carbon concentration of soils that is correlated with product application which furthermore increase crop yield.

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