IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 4, Issue 2 (Jul. - Aug. 2013), PP 56-60
www.iosrjournals.org

A Novel Formulation & Effect of Iron Particles over the Ground Nut.

Sanap Sandip R[1]. Solanki Pooja V[1]. Patil Sujata N[1]. Wagh Mayur A[1]. Bhamare Harshal M[1]. Sardar Vishal B[1].Chaudhari Poonam B[1]. Raut Ranjit R[2].Ahire Mayur A[2]. Sanap Pravin R[3].

[1]*Department of Microbiology & Biotechnology. S.S.V.P.S's Science College, Dhule.*
[2]*Department of Microbiology & Biotechnology ; P.V.P. College, Pravaranagar.*
[3]*K.V.K.Y.C.O.U. Nasik*

Abstract: *Cash crops like dicotyledons i.e. all pulses, groundnut, pea .bean etc. are important in agriculture economy. Stimulation of this plants growth during early stages is commercially important. Iron (Fe) particles perform very important role in nitrogen fixation. To solve oxygen toxicity problem, the bacteria in the root nodules are bathed in solution of the oxygen binding Heme protein leg hemoglobin produced by plant. Leg Hemoglobin binds all available oxygen so that it can't interfere with nitrogen fixation.Therefore iron treatment is useful for leguminous plants like groundnut, pea etc.*

Key words: *Heme protein, leg hemoglobin, leguminous plants, dicotyledons.*

I. Introduction

The elements essential for plants are C, H, O, N, P, K, Ca, Mg, S, Fe, Cu, B, Mn, Mo, Zn, Cl. Out of these 16 elements, 9 essential elements have been classified as macronutrients" as these are required in relatively large amount by the plants.(MUHAMMAD IMTIAZ *ET AL-2010).* Groundnut being important oil seed crop. The area of 52 and 30 thousand hectare during rabbi/summer and kharif seasons, respectively (Anonymous, 1999). It is grown both in black and red soils under irrigation. However, the cropped area under black soils is higher (86 % of total), as the command area consists predominantly of deep and medium deep black soils.(Karnataka J. Agric. Sci., 2007). A field experiment was conducted in the year 2012-2013. Keeping this in view, a study was undertaken to know the effect of iron management practices on performance and nutrient uptake by ruling groundnut genotypes in irrigated land. Iron is a necessary mineral for plants' biological redox system and an important component of many enzymes. In the present study, effect of iron on morphological, biochemical, and physiological properties of groundnut were investigated.(Pooladvand, S., M. Ghorbanli and M. Farzami Sepehr. 2012.) The findings suggested that $FeSO_4$ increased seed production, nodule formation and the number of pods and leaves. However, higher concentrations of FeSO4 reduced nodules and leaf numbers. It was also observed that antioxidant enzymes activity in roots and shoots gradually increased with an increase in $FeSO_4$ concentration. The iron content in the treated plants increased in proportion to the increase in $FeSO_4$.

The findings suggested that FeSO4 increased seed production, nodule formation and the number of pods and leaves. However, higher concentrations of FeSO4 reduced nodules and leaf numbers. It was also observed that antioxidant enzymes activity in roots and shoots gradually increased with an increase in FeSO4 concentration. The iron content in the treated plants increased in proportion to the increase in FeSO4. iron enters root cells, it must be transported to the leaves. In xylem iron is transported as Fe (III) and probably makes complexes with citrate (Cataldo et al., 1988). Iron (Fe) is an essential nutrient element with a crucial function in plants. It takes part in photosynthesis, respiration, DNA synthesis, and hormone structure and action (Graziano and Lamattina 2007). Fe deficiency impairs chlorophyll biosynthesis and chloroplast development in both dicotyledonous and monocotyledonous species (Graziano et al. 2002). Plant food Processor and Finally the yield is reduced. Iron shortage symptoms are first seen as the yellowish color between leaf veins, especially in young leaves, which could result in the necrosis of all these leaves.(Raziyeh Mohamadipoor *et al ,2013).* The optimal FeSO4 concentration in a medium should be sufficient to satisfy the basic energy requirements for cell division, differentiation and not impose any negative osmotic effects on shoot formation. (Plant Omics Journal- 2009).

Plants are the immense example of autotroph mechanism. Photosynthesis is a source of energy for virtually all of the organisms on the earth. Survival and reproduction of plants require water, air, light and relatively considerable amounts of nutrients called essential nutrients to carry out photosynthesis and thus produce energy (Wiedenhoeft, 2006). Iron and zinc are usually present in soil in adequate to excess amounts, but deficiency is caused by their presence in an unavailable form rather than by their lack, and a plant can

improve its iron and zinc uptake by using strategies solubilize the iron and zinc present in the soil (Rengel,2001).

There are three ways in which nutrient ions in soil reach the root surface. These are interception, Whereby ions attached to root hair surfaces (e.g. H+) may exchange with ions held on the surface of clays and organic matter in soils due to intimate contact; mass flow, where nutrients are transported in the flow of water to the root resulting from transpirational water uptake by the plant; and diffusion, involving ions moving from areas of high concentration to those of low concentration. Upon reaching the root surface, ions are moved into the plant root by passive and active uptake. Generally, ions in the soil solution enter the roots through passive diffusion and ion exchange. They are then actively taken up into cells against an electrochemical gradient by ion carrier complexes (Tisdale *et al.,* 1993). Fe deficiency is foliar application of Fe solutions. This method of correction usually alleviates chlorosis; however, the results from a foliar application may be only temporary and actually depress the plant's Fe stress mechanisms by preventing the increase in Fe-reducing capacity of the roots that would normally occur during Fe by deficiency (Romheld and Marschner, 1986). Effective $FeSO_4$ treatments mentioned above were either placed in a concentrated band near or with the seed while the ineffective treatments were mixed with the soil. Iron sulfate added to calcareous soils quickly reacts with $CaCO_3$ to form Fe oxides that are less available for plant uptake. By concentrating $FeSO_4$ in a band, the Fe is possibly available longer for plant uptake, compared with Fe that is mixed throughout the soil, because of less fertilizer to soil contact. Soil factors that determine the effectiveness of the $FeSO_4$ include soil texture, pH, and $CaCO_3$ content (Vempati and Loeppert, 1988).

Aims & Objective

- ✓ To increase the growth of plant by using ferrous treatment to the seeds.
- ✓ To Standardize dose if iron particles on selected seeds (Plants).
- ✓ To increase the production of pulses, pea, bean, Ground nut etc.
- ✓ Morphological & Biochemical analysis of treated plants against untreated plants.

II. Materials & Methods

- ➢ **Materials**
- Ferrous Particles ($FeSo_4$)
- Distilled Water
- Seeds(Ground nut)
- ➢ **Equipment**
- Spectrophotometer
- pH Meter
- ➢ **Method**
- Iron particles dissolved in distilled water.
- Adjust pH 5.8.
- Seeds were soaked in solution for 15 min.
- Soaked seeds were sown in farm.
- Check the growth from 5^{th} day of plantation.

Observation

Table 1.Days required to achieve specific height (0.2cm) at concentration of $FeSo_4$ 2gm/100 ml.

Concentration(Gm)	Treated(Days)	Control(Days)
0.5	9	10
1.0	7	10
1.5	6	10
2.0	5	10
2.5	5	10

Table 2.Height of Plants.

Days	Treated(cm)	Control(cm)
08	0.4	0.1
10	0.9	0.2

12	1.4	0.5
14	1.9	0.9
16	2.3	1.2

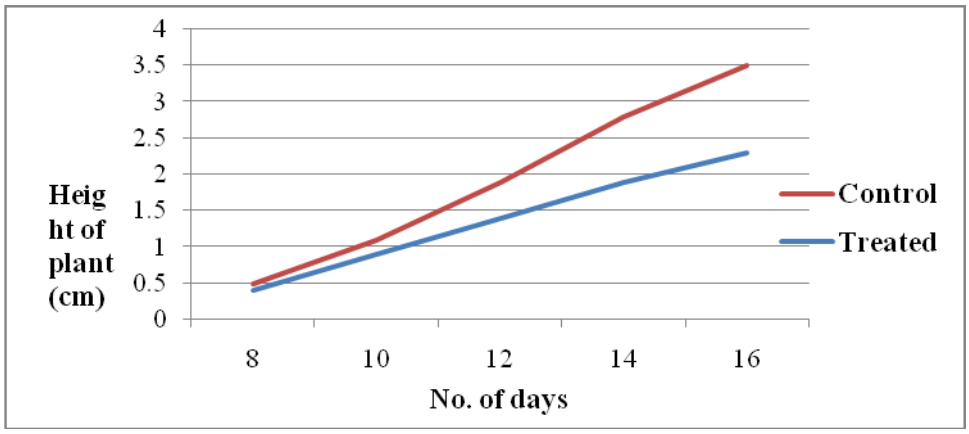

Fig. 1

Left side Treated & Right side Control

Left side Control & Right side Treated

Fig .2

Table 3.Number of Leaf.

Days	Treated	Control
14	4	2
18	7	4
22	9	5
26	12	7
30	15	10

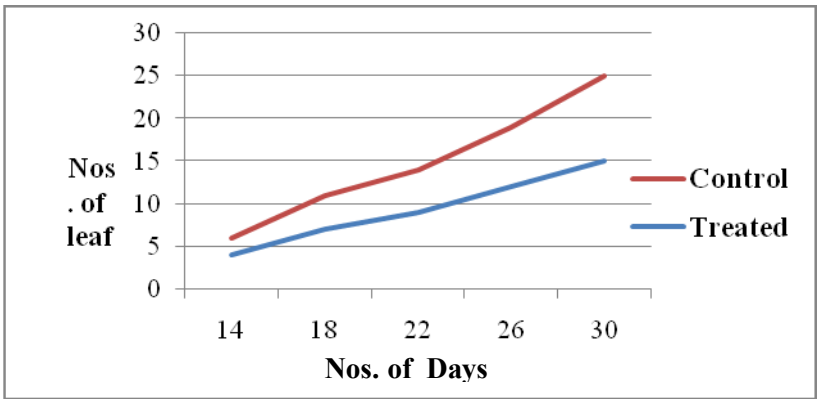

Fig.4

Biochemical Analysis:-

Table 4. Chlorophyll a (mg Chlorophyll a/gm tissue).

Days	Treated	Control
20	3.121	1.567
22	5.458	2.542
24	7.489	4.152
26	10.133	6.655
28	13.161	8.596

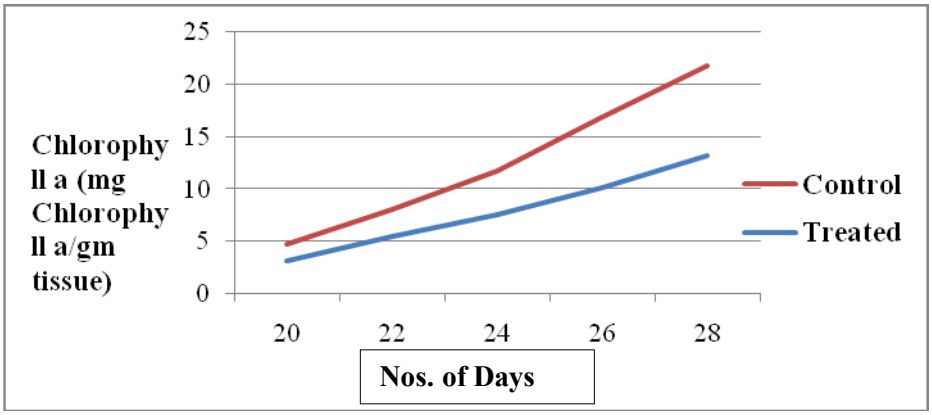

Fig.5

Table.5 Chlorophyll b (mg Chlorophyll b/gm tissue).

Days	Treated	Control
20	3.121	1.567
22	5.458	2.542
24	7.489	4.152
26	10.133	6.655
28	13.161	8.596

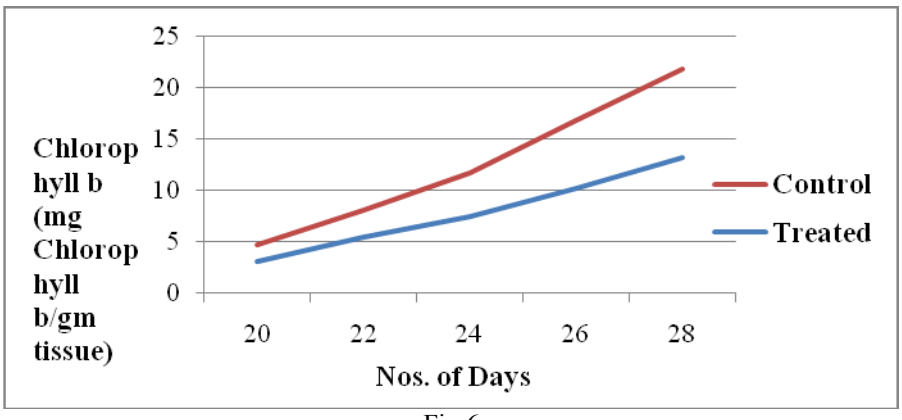

Fig.6

Features

- ✓ Cost effective method.
- ✓ Easy to prepare at home.
- ✓ Easy for large scale production.
- ✓ Increase productivity of groundnut.

III. Result and Discussion

Seeds treated with ferrous shows better growth & yield productivity.Table1 shows better result occurred in 2 gm $FeSO_4$/100 ml and 2.5 gm/ml. But mostly we use 2.0 gm $FeSO_4$/100 ml, because high concentration also dangerous to plant and health also. Table.2, fig.1 and fig.2. Shows height of plants than normal in containing 2 gm $FeSO_4$/100 ml. Then we preferred 2 gm $FeSO_4$/100 ml is standard for our research.

Table.3 and fig.3 shows number of leaves with days. That shows that the number of leaves also increases in treated set. So it helps in photosynthesis and this way energy gets in large numbers. For photosynthesis Chlorophyll a and Chlorophyll b play an important role. Amount of Chlorophyll a and Chlorophyll b also increase than control shows in Table.4.and 5.as well as in fig.5 and 6.

For groundnut production mostly Tikka disease causes the plant and affect on yield. In such case mostly leave of plant get damage with black spots. That's why plant can't work properly for photosynthesis and finally yield decreases.

Acknowledgement

This research is conducted with support of Dr. Nitinkumar P. Patil & Prof. Harshal M. Bhamare. Authors are thankful to Dr. S.N.Nandan Principal, S.S.V.P.S's Science College, Dhule for providing necessary laboratory facilities.

References

[1]. ANONYMOUS, 1999, Annual Progress Report for 1998-1999. Land Development Officer (Agri), Krishna-CADA, Bheemarayanagudi, India.
[2]. Anonymous. 1998. Micronutrients in agriculture: Pakistani perspective. National Fertilizer Development Centre, Islamabad, Pakistan. 51 p.
[3]. Anonymous. 2000. Report, Planning Division Islamabad, Government of Pakistan
[4]. Anonymous. 2002. Reducing risks, promoting healthy life. World Health Organization, Geneva, Switzerland. 230 p.
[5]. Anonymous. 2007. International Zinc Association. Zinc in fertilizers, Essential for crops.www.zincworld.org
[6]. Cataldo D. A., K. M. McFadden, T. R. Garland and R. Wildung.2233. 'Organic constituents and complexation of nickel (II), iron (III), cadmium (II), and plutonium (IV) in soybean xylem exudates'. Plant Physiol. 86(3):734- . 922
[7]. Graziano M., Beligni M.V., Lamattina L. (2002): Nitric oxide improves internal iron availability in plants. Plant Physiology, 130: 1852–1859.
[8]. Graziano M., Lamattina L. (2007): Nitric oxide accumulation is required for molecular and physiological responses to iron deficiency in tomato roots. Plant Journal, 52: 949–960.
[9]. Huda, K.M.K., Bhuiyan, M.S.R., Zeba, N., Banu S.A., Mahmud, F.and Khatun A. (2009). Effect of FeSO4 and pH on shoot regeneration from the cotyledonary explants of Tossa Jute, Plant Omics Journal.2(5):190-196.
[10]. Imtiaz M *, Rashid A, Khan P,Memon M.Y. AND Aslam M.(**2010).** The Role of Micronutrients in Crop Production and Human Health. Pak. J. Bot., 42(4): 2565-2578.
[11]. Kuligod V. B., Revanappa,. Kulkarni G. N AND. Upperi S. N, (2007). Nutrient Management for Sustainable Groundnut Productivity in Black Soils of Upper Krishna Canal Commands Karnataka J. Agric. Sci., 20(4): (732-734)
[12]. Mohamadipoor R,Sedaghathoor S and Khomami A.M(2013) Effect of application of iron fertilizers in two methods 'foliar and soilapplication' on growth characteristics of Spathyphyllum illusion. European Journal of Experimental Biology, 3(1):232-240. http://www.pelagiaresearchlibrary.com
[13]. Pooladvand, S., M. Ghorbanli and M. Farzami Sepehr. 2012. Effect of various levels of iron on morphological, biochemical, and physiological properties of Glycine max var. Pershing. Iranian Journal of Plant Physiology 2 (4), 531-538.
[14]. Rengel, Z. (2001). Genotypic differences in micronutrient use efficiency in crops. Comm. Soil Sci. Pl. Anal. 32, 1163–1186.
[15]. Romolhe1d V and. H. Marschner. 1986b. Mobilization of iron in the rhizosphere of different plant species. Adv. Plant Nutr. 2:155–204.
[16]. Tisdale, S.L., Nelson, W.L., Beaton, J.D., & Havlin,J.L. (1993). Soil Fertility and Fertilizers (5th edn.) (pp.14, 47, 68–71, 96–103). New York: Macmillan Publishing Company.Tossa Jute, Plant Omics Journal.2(5):190-196.
[17]. Vempati R.K and LoeppertR.H. 1988.Chemisry and minerarolgy of Fe- containing oxides and layer silicates in relation to plant available iron. J. Plant.Nutr.11:1557-1574.
[18]. Wiedenhoeft AC (2006). Plant Nutrition. Chelsea .publisher, New York.