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Role of Iron, Zinc and Boron in Production of Pant C-1 Lemon

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Under tropical and subtropical climates citrus is one of the major fruit crops. Among the citrus species, lemon is one of the important species and citrus cultivated in warm southern slopes of the Himalayas in North-Eastern India and adjacent to Burma, Southern China and Indo-China. It flourishes under humid and semi-arid condition and can tolerate heat and cold better than lime. Lemon contains 35-45 mg/100 g ascorbic acid, 7-8 ^{0}Brix TSS, 30-35 per cent juice and 6-7 per cent acidity and p^{H} of fruit ranges 2-3.

Botanical name	*Citrus limon*
Family	Rutaceae
Chromosome	2n=18
Origin	India

The fruit of Pant-C1 lemon is larger as compared to other variety and hence, the juice content of Pant- C1 fruit tends to be more. This variety is from India. It is hardy, medium, vigorous, spreading drooping, dense foliage, thorny, fruit color is yellow, smooth, nippled apex, base round, thin rind, hollow axis, segments 10-12 and matures during November- February.

Climate: Lemon grows well in areas which are free from frost, strong winds and are warm and moderately humid. Can grow up to 1000m elevation with annual rainfall not exceeding 750 mm. Lemons can be grown in both humid and semi humid areas upto 1200m elevation and tolerate frost better than acid lime. Lemon grows well in deep (2-2.5m) well drained soils rich in organic matter. Optimum pH is 6.5-7.0. It cannot grow in water logged soils, alkaline soils with high lime content. Lemons grow better in shallow soils also if well drained.

Manure and Fertilizer: 25 kg well rotten FYM and fertilizers, 250 g N, 250 g P2O5, and 150 g K2O per plant were applied. Entire dose of farm yard manure + 1/3 N + full dose of P2O5 + K2O were applied before flowering and 1/3 of N per plant were applied in August and remaining 1/3 of N were applied in November.

Role of Micronutrients

1. **Iron-** Iron is one of the micronutrients becomes exceedingly mobile under waterlogged conditions; otherwise it is highly immobile in plant. In acid soils, soluble Fe could fix phosphates which are aggravated further by high water table and water logging. While on alkaline calcareous soils, lime induced iron chlorosis is perhaps the most researched nutritional disorder in citrus. Availability of Fe becomes less available in soils having pH beyond 7.8. High available Fe could induce Mn-deficiency. Iron by plant is absorbed in Fe2+ form. Iron (Fe) is also an important micronutrient necessary for the citrus plants. It involve in nucleic acid metabolism in the chloroplast. It has been reported that the

application of iron sulphates as the foliar spray reduces the leaf chlorosis and consequently increase the yield. It also helps in a significant increase of fruit yield, fruit volume, ascorbic acid content and leaf iron content in citrus. Iron play roles in plant metabolism such as, it is constituent of cytochromes, nonhaeme iron proteins, which are involved in photosynthesis, N2 fixation and respiratory linked dehydrogenase. It involved in reduction in nitrate and sulfates and activity of peroxidases are considered biochemical index of Fe-deficiency.

2. **Boron-** Boron is absorbed in H_3BO_4 form. Boron plays role in translocation of sugar from leaves to other part of plant, an important step towards enhanced photosynthesis. The compounds would more easily traverse cellular membrane than would the high polar sugar molecule themselves. Indirect evidence for involvement of B in carbohydrate transport, borate forms complexes with certain carbohydrates but natural borate complexes in plants yet to be identified. Also plays role in flowering, pollen tube growth N metabolism and hormone activity in addition to maintenance of Ca in soluble form. Boron (B) also plays a vital role in the growth behaviour and productivity of the citrus fruits. It increases the phenolic compound production in the plant system that is responsible for the polar transport of auxin.
3. **Zinc-** Zinc is the most important micronutrient of global concern, and highly deficient nutrient of equal magnitude on both acid as well as alkaline soils. It is an immobile nutrient in plant. The availability of Zn in soil is adversely affected by soil calcareousness, high P content, salinity/sodicity, over liming etc. Zinc is absorbed in Zn^{2+} form by plant. Among the micronutrients, zinc (Zn) is the important nutrient required in the enzymatic activities for the nitrogen and carbohydrate metabolism and it results the increasing the uptake of nitrogen by citrus plants for its growth and developments. Its deficiency problem is next to nitrogen deficiency in occurrence and it has been reported from all the citrus growing countries in the world. Lemon shows the decrease in the yield if the deficiency of Zn is occurs in the plants at the earlier stage of growth when there are no signs of pathological symptoms. Zn is required for the synthesis of tryptophan which is the precursor of Indole acetic acid synthesis resulting in the growth and development of tissues. Zinc is essential constituent of alcohol dehydrogenase, glutamic dehydrogenase, lactic dehydrogenase, carbonic anhydrase regulating equilibrium between carbon dioxide, water and carbonic acid, alkaline phosphatase, carboxypeptidase-β and other enzymes, dehydropeptidase and glycylglycinedipeptidase for protein metabolism.

Pruning and Training: Lemon may be trained as low headed plants. Pruning is mainly to remove dried, diseased and overcrowding branches. Grownup lemons may be given light pruning every year to remove already fruited shoots.

Irrigation: Lemon require more water; irrigation may be given if top 25cm soil becomes dry. Drip irrigation improves yield.

Interculture: Mulching basins will be very beneficial. Weeds can be controlled by using weedicides like Monouron, Diuron and Gramaxone etc.

Harvesting and Yield: Harvesting season extends from Jan-September depending upon the locality for May for lemons. Yield of lemon is 8.4 kg/plant or 23.26 q/ha