**Phosphate (P) Uptake Potential in Soyben Roots**

The experiment was conducted on the greenhouse grown potted plants provided with 100 and 600 ppm of P. Five plants of variety (P46A16R) were used for measuring the length of the primary root at 30, 60, 75, and 110 days (coincided with V4, R3.5, R5.5, and R7 developmental stages) after sowing. Roots were removed carefully by washing the potting material from the pots. A part of the same root was used for the determination of tissue localized phytase, acidic phosphatase, and alkaline phosphatase. The extract from root tissue was used to determine the phytase, acidic phosphatase, and alkaline phosphatase activity at different stages of root growth. Only three root orders exist in soybean plants. We classified roots into primary; first order, secondary; Second order, and tertiary roots; third order roots. Most of the nodules are located on the primary and secondary roots. This indicates the importance of secondary roots in soybean growth and development and nitrogen fixation. A few smaller nodules were also observed on the tertiary roots. Primary root length increased up to 60-DAS (days after sowing) and then declined. However, there was no significant difference in root length at two different concentrations of P (P-100ppm and P-600ppm). The number of secondary roots increased up to 60-DAS and then declined in both the treatments (P-100ppm and P-600ppm). However, the number of secondary roots was higher in P-600 ppm treatment up 110-DAS. Similar results were observed for third order roots. Tertiary/third roots were not observed at 9-DAS. The number of tertiary roots increased up to 75-DAS and then declined in both P treatments (P-100ppm and P-600ppm). However, the number of tertiary roots was higher in the P-600 ppm treatment up to 110-DAS, except at 30DAS. These observations showed the positive effect of higher P on tertiary root growth. Alkaline phosphatase activity was the highest at 60-DAS and then declined. Among root orders, the highest alkaline phosphatase activity was observed in tertiary roots followed by secondary and primary roots. High P (P-600 ppm) treatment enhanced the activity of alkaline phosphatase in comparison to P-100 ppm treatment. Acidic phosphatase activity was the highest at 75-DAS and then declined. Among root orders, the highest acidic phosphatase activity was observed in tertiary roots followed by secondary and primary roots. High P-600 ppm treatment enhanced the activity of acidic phosphatase in comparison to P-100 ppm treatment. Acidic phosphatase activity was the highest in comparison to Alkaline Phosphatase and Phytase throughout the growth period. Phytase activity was the highest at 60-DAS and then declined. Among root orders, the highest Phytase activity was observed in tertiary roots followed by secondary and primary roots. High P-600 ppm treatment enhanced the activity of phytase in comparison to P-100 ppm treatment. Phytase activity was minimum in comparison to alkaline and acid phosphatase. The number of nodules per plant increased up to 75 DAS. High P (600 ppm) treatment enhanced the number of nodules in comparison to P-100 ppm treatment. Nodule acidic phosphatase activity increased up to 75-DAS and then declined. High P-600 ppm treatment enhanced the enzyme activity in comparison to P-100 ppm treatment. Nodule Phytase activity increased up to 75-DAS and then declined. No difference in phytase activity was observed among the treatments. Total P content was more in seeds under P-600 ppm treatment in comparison to P-100 ppm at harvest. Phytate content was the highest in seeds at harvest in comparison to inorganic P and other types. Total vegetative dry weight was more in the leaves followed by stem and root. High P (600 ppm) treatment increased the total vegetative dry weight in comparison to P-100 ppm treatment at harvest. Yield per plant was higher in High P (600 ppm: 18.4 g/plant; 0.00052 bu/plant) treatment in comparison P-100 ppm at harvest. Similarly, the numbers of pods were higher in High P (600 ppm) treatment in comparison P-100 ppm (14.8 g/plant; 0.00041 bu/plant) at harvest. High P (600 ppm) treatment improved the root growth, increased the activity of P mobilizing enzymes, and plant dry matter and yield. This work summarizes greenhouse testing and is directly applicable to plant response, but not in field production system.