

Effects of root nodules on the plant type in soybean-Especially internode length and petiole length on the main stem

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Abstract

The plant type is generally one of the most important factor for crop production and be influenced by nitrogen absorption. Soybean plants have nodules in their roots, supplying nitrogen at the vegetative and reproductive stages. Root nodules seem to effect plant type of soybean plants, but there are few reports on the relation nodules and plant type. We tried to clarify the effects of root nodules on the plant type, especially internode length and petiole length, comparing non-nodule soybean with normal soybean. The pot experiment and field experiment were carried out at Mie University and Utsunomiya University in 2015 and 2016. Enrei, a popular cultivar in central Japan, and En1282, non-nodulating isogenic line of Enrei, were used. The petiole length on main stem was measured after defoliation and internode length and yield components were measured after harvest. In the field experiment, the patterns of the final length in internode and petiole on main stem were consistent in both cultivars, and a positive correlation was found between the Nth petiole length and the N-1th internode length, belong to the same phytomere. Therefore, the petiole and internode on the main stem make similar response for environmental factors. In pot experiment, Enrei grew with the same pattern as field experiments, but in En1282, the elongation of petiole and internode in the upper part was suppressed, especially the petiole was suppressed greatly. The main stem becomes the basis of the plant type. These results were considered that the nitrogen is distributed preferentially to the internode than the petiole. It seems that the pot cultivation restricted the rhizosphere and caused nitrogen deficiency in En1282. These results suggested that the slight nitrogen deficiency provided from the root nodules was compensated by the increase of the amount of inorganic nitrogen absorption due to the expansion of the rhizosphere, and the severe nitrogen deficiency suppressed elongation of petiole and internode. It is clear that root nodules effect the plant type by supplying nitrogen to internodes and petioles.

Keywords: soybean, plant type, root nodule, petiole length, internode length

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