In plants with treated primary leaves grown at a photon flux density of 160 $\mu Em^{-2}s^{-1}$ photosynthetically active radiation (PAR), ABA application enhanced plant growth (total dry matter, total plant nitrogen, nodule acetylene reduction rates (AR)) and increased nitrogen and dry matter partitioning to roots and leaves. In contrast, BA application reduced plant growth. At a higher light level (350 $\mu Em^{-2}s^{-1}$, PAR) differences in parameters between treatments and controls were not as pronounced; however, the trends at both light levels were similar for treated plants.

ABA effects were more pronounced with treatment of the first trifoliolate leaf. Diurnal AR was comparatively higher in ABA-treated plants and relative efficiency showed least change in ABA plants. Leaf and nodule metabolite levels varied with time of day and were influenced by the treatments. ABA plants assimilated the greatest amounts of $^{14}CO_2$ and showed greater distributions of ^{14}C-labelled assimilates to roots and upper leaves. In controls, upper stems accumulated 46% of total plant radioactivity.

These results demonstrate that plant growth substances can alter nodule function and subsequent partitioning of assimilates. This information should aid our understanding of factors which influence assimilate partitioning in nodulated systems.

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BEAN PLANTING SYSTEMS IN BRAZIL

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There is general interest in expanding Brazilian bean production to additional agricultural areas. However, the major constraint to expansion is low yields due to low soil fertility. In addition to using fertilizer and good quality seed, a possibility for improving yield is to improve the system of planting.

An experiment was conducted over 5 years in a randomized complete block design with 4 replicates in a split-plot layout during dry season (February, March, April). All plots were planted to the cultivar Carioca and received 10 kg N/ha and 30 kg K_2O/ha in the row at planting. Main plot factors consisted 20 kg N/ha side-dressed 30 days after emergence in each planting system:

I. Double rows, alternating 0.30m and 0.70m spacing between rows, with 80 kg P_2O_5/ha (ground apatite rock) broadcasted in the 0.30m interval;

II. Double rows, as above, with 80 kg P_2O_5/ha (simple superphosphate) applied in the row;

III. Double rows, as above, with 80 kg P_2O_5/ha (apatite) broadcast in 0.30m interval and 80 kg P_2O_5/ha (simple superphosphate) applied in the row; and

IV. The traditional system of single rows spaced 0.50m spart, with 80 kg P_2O_5/ha (simple superphosphate) applied in the row.

The subplot factor was plant population: 160,000, 200,000, and 240,000 plants/ha.

Across years, grain yield was significantly higher in the traditional system than in the double row systems tested and at a population of 200,000 plants/ha (Table 1). Side-dressing N increased yield almost 300 kg/ha (Table 1). The largest differences in yield were due to year of planting (Table 1).

Table 1. Bean grain yield (kg/ha) over 5 years in 4 planting systems and 3 plant populations, in the presence or absence of side dressed N. Values are means of 4 replicates.

Treatment	Year 1	2	3	4	5	Mean
Planting System	703 b	577ab	1153 b	963	841 b	
I	703 b	577ab	1153 b	963 c	841 b	847 b
II	706 b	528ab	1130 b	1003 bc	889 b	851 b
III	803ab	504 b	1153 b	1152ab	861a	894 b
IV	1049a	786a	1176a	1226a	1288a	1165a
Plant/ha						
160,000	763	630	1186 b	1021	915a	903 b
200,000	860	607	1427a	1152	951 b	1000a
240,000	823	560	1071 c	1084	1046a	916 b
Side-dressed N						
+	893	709	1364	1253	1213	1086a
-	738	488	1092	918	726	792 b
Mean	8152B	599C	1288A	1086A	970AB	939
C.V.(%)	12,86	22,89	12,05	20,79	9,31	15,81

[1] Value in a column followed by the small letter do not differ significantly (P 0.05) by Tukey's HSD.

[2] Values in a row followed by the same capital letter do not differ significantly (P 0.05) by Tukey's HSD.