

COMPARATIVE STEM ANATOMIC STUDY OF COMMON BEAN (*Phaseolus vulgaris* L.)
GENOTYPES

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In Brazil, the common bean is grown mainly in two traditional planting seasons: dry and rainy season. Since 1980's there were a remarkable increase in the sprinkler irrigation areas of "cerrado" region of Brazil. Under this technified planting system, a bean genotype with high pod insertion, lodging resistance, erect plant type and high productivity became the main objective of the CNPAF breeding program, to allow bean crop expansion. The objective of the present study was to evaluate common bean genotypes in regard to their stem anatomical characteristics which can improve lodging resistance.

The experiment was carried out in the field with the following genotypes: WBR 22-55 plant type II (CIAT 1981) erect; ESAL 522 plant type III, prostrate and the brazilian widely grown cultivar, Carioca plant type II/III, semi-prostrate. Stem samples were collected at 3, 10, 17, 25, 32, 44 days after plant emergence. Stem thickness and length of the first three internodes were measured. Slices were also made to evaluate the xylem and sclerenchyma amount, the two main plant supporting tissues.

The bean genotypes showed quantitative differences in the amount of the plant supporting tissue. The bean genotypes WBR 22-55 showed higher amount of xylem and sclerenchyma than Carioca and ESAL 522 (Figure 1). Although the percentage of the areas occupied by these tissues had the same proportions in the internodes, no difference was observed among genotypes (Figure 1). Among the evaluated internodes, the hypocotyl showed higher amount of xylem and the second internode, higher amount of sclerenchyma (Table 1). The development of the supporting tissue in the three internodes was higher between 17 and 25 days after emergence of the plants, with the xylem increasing three times during this period (Table 2).

This study indicated that there were differences among bean genotypes on the amount of stem supporting tissue and that measurement of the quantity of these tissues between 17 and 25 days after plant emergence can be used as a selection criterion in bean breeding programs which the objective is the development of bean genotypes with erect plant type.

Table 1. Total xylem and sclerenchyma areas (cm^2) in the first three internodes of the main stem of three common bean genotypes at 44 days of plant emergence.

Cultivars	Xylem			Sclerenchyma		
	Hypoc.	1st inter.	2nd inter.	Hypoc.	1st inter.	2nd inter.
WBR 22-55	1030,3	1003,0	794,9	71,1	124,7	141,1
Carioca	726,3	420,5	400,4	52,3	67,2	81,5
ESAL	600,1	523,4	365,3	52,0	61,0	89,6

Table 2. Total xylem and sclerenchyma areas in the first three internodes of the main stem of three bean genotypes at 3, 10, 17, 25, 32, 44 days after emergence.

Cultivars	Xylem						Sclerenchyma					
	3 ²	10 ²	17	25	32	44	3 ²	10 ²	17	25	32	44
WBR 22-55	24,1	65,7	134,5	522,2	634,2	1.447,6	17,7	17,1	42,8	86,6	82,9	95,9
Carioca	10,7	43,1	80,9	233,9	429,5	749,1	4,5	16,3	33,4	45,5	53,1	48,4
ESAL 522	12,3	52,2	65,1	255,7	364,5	749,9	5,5	15,5	25,7	45,0	59,1	52,1

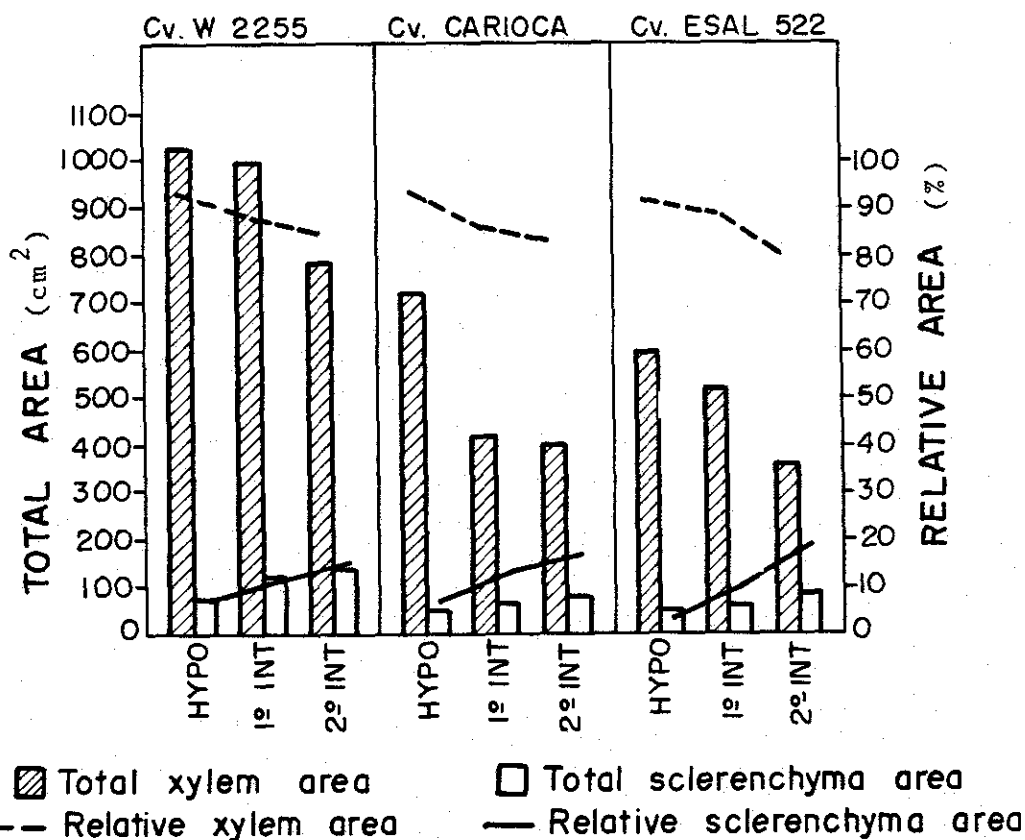


Figure 1. Total (cm²) and relative (%) xylem and sclerenchyma areas in the hypocotyl, 1st and 2nd internodes of the main stem of three bean genotypes WBR 22-55, Carioca and ESAL 522.