
BEAN BREEDING FOR RED-SEEDED TYPES AT THE NATIONAL RESEARCH CENTER
FOR RICE AND BEANS (CNPAP), GOIANIA, GOIAS - BRAZIL

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Red-seeded types of beans are among the most important in Brazil. They represent about 20% of the total Brazilian production. The principal producers are the States of Goias, Minas Gerais (the western and southern parts), Sao Paulo (the southern part) and Parana (the northwestern part). Within the red-seeded types, the most conspicuous colors of grains are a purple, medium-to-large seed size, a sub-group known as "roxinho", and a pink, medium seed size, a sub-group known as "rosinha".

For many years, the cultivar known as 'Roxao' has been the most used by Brazilian farmers from those areas. However, many yield trials have shown it is a low-yielding cultivar.

In order to improve yield of the cultivar 'Roxao', mass selection was initiated in 1952/53. This practice, as well as single crosses, did not produce significant progress in yield. As a consequence, in 1964, in Patos de Minas, State of Minas Gerais, and later in Uberaba, Minas Gerais, a multiple crossing plan was designed. The characteristics of the cultivars involved in this plan are presented in Table 1. It can be seen that the cultivars possessed resistance to the most important diseases found in the production areas, namely rust, powdery mildew, common mosaic virus and anthracnose. The final cross was made in December, 1966. Mass selection was performed in 1972 in the F₈ generation, resulting in two sub-populations; one from the group 'roxinho' (11% of the total selected) and another from the group "rosinha" (6% of the total selected).

In March, 1978, these two sub-populations were sown at the CNPAP, Goiania, and 1000 individual plants were selected. With basis on grain color, that number was reduced to 500, being 277 from the group "roxinho" (152 with purple pods and 125 with white pods), and 223 from the group "rosinha" (98 with purple pods, and 125 with white pods). These 500 lines were tested for yield in November 1978 by using the cultivars "Roxao EEP" (a widely used cultivar developed at the Patos de Minas Experimental Station), and "Rico-23" (a black-seeded type with broad adaptation and good yielder) as checks. Two hundred sixteen lines had higher yields than both checks. These 216 lines were again tested in July 1979 for yield, using again check cultivars located among every ten test lines. The checks were the cultivars "Roxao EEP", "Carioca" (a cream-seeded type with black stripes, high yielding and with broad adaptation), and Cornell-49242 (a black-seeded line, with the Are gene for resistance to anthracnose). The cultivar Cornell-49242 was used as resistant check to anthracnose and rust, while "Roxao EEP" was used as susceptible check for both diseases.

Lines that outyield the check cultivars will be distributed to four experimental stations within the production area for preliminary yield trials.

Table 1. Agronomic characteristics of the cultivars engrossed in the multiple crossing plan for yield improvement of the cultivar 'Roxão'

| Cultivar | Nº days to flowering | Nº days to maturity | Mean Nº seed per pod | Seed color | 100 seed weight | Reaction to Diseases | | | |
|----------------------|----------------------|---------------------|----------------------|------------|-----------------|----------------------|----------------|---------------------------------|---|
| | | | | | | Rust | Powdery mildew | Common Mosaic Virus Anthracnose | |
| Roxão EEP | 40 | 87 | 6,5 | Purple | 18,0 | 84,85 | S | R | S |
| Hui 14 | 38 | 87 | 7,0 | Purple | 27,70 | 83,30 | S | R | S |
| Oax 55B | 38 | 84 | 4,6 | Purple | 31,0 | 81,25 | R | R | H |
| Nic 2 | 30 | 72 | 5,6 | Purple | 24,80 | 79,00 | R | R | R |
| 1910 | 36 | 85 | 5,6 | Orange | 19,80 | 87,75 | S | R | R |
| Super Roxão (29) | 35 | 81 | 5,0 | Purple | 23,50 | 83,05 | - | - | - |
| Enxofre | 38 | 84 | 5,2 | Yellow | 21,80 | 84,85 | S | R | S |
| Pão | 35 | 84 | 6,1 | Yellow | 47,50 | 78,80 | R | R | R |
| Roxão Três Barras | 36 | 85 | 6,1 | Purple | 39,20 | 82,60 | S | R | R |
| SAC 965 | 31 | 79 | 3,4 | Black | 44,35 | 79,00 | S | S | R |
| México 450 | 39 | 84 | 7,0 | Black | 23,50 | 78,60 | R | S | R |
| Branco de Uberlândia | 38 | 82 | - | White | - | - | R | R | R |