# CHARACTERIZATION OF FINAL TRIALS FOR CULTIVAR RELEASE OF THE BRAZILIAN COMMON BEAN ASSAY NETWORK COORDINATED BY EMBRAPA

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The number of final trials for cultivar release conducted by the Embrapa common bean breeding program and partners is very large, once these trials are accomplished in all four growing areas in Brazil (Pereira *et al.*, 2010), representing different environmental conditions. These environmental variations directly influence the agronomic performance of the tested advanced lines, including yielding and disease reaction. The characterization of the final trial network can support decision making and optimize breeding program efforts to ensure more security on recommendation process of new cultivars. Therefore, the present work aimed to characterize the Brazilian common bean assay network coordinated by Embrapa. Information of experiments conducted from 2003 to 2012 for the market classes "carioca" and black was used. These market classes represent 70% and 17%, respectively, of the bean consumption in the country. The data used in this study were generated from final trials conducted during all growing seasons in the common bean growing areas 1, 2 and 3, as showed in Figure 1, where 98% of the Brazilian common bean is produced. All trials were conducted in randomized block design, with three replicates, using plots with four rows of four meter long.
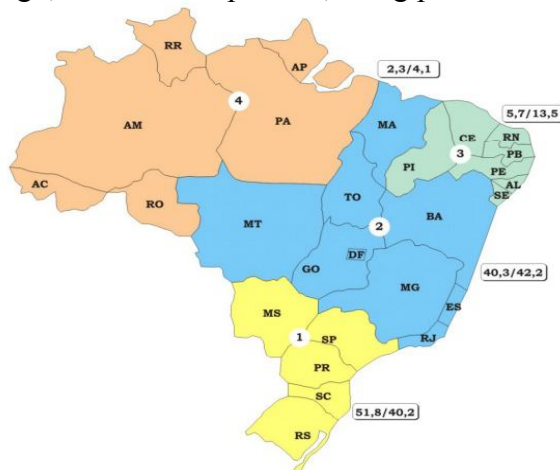
Figure 1. Brazilian common bean growing areas 1-to-4. The numbers into the boxes are, respectively, common bean grain production and planted area in percentage for each growing area. Source: Feijão (2010), adapted by Pereira *et al.* (2010).

During the period of 2003-2012, 68 "carioca" seeded genotypes (59 advanced lines and nine control cultivars) were evaluated in 364 trials. A total of 55 black seeded genotypes (44 advanced lines and 11 control cultivars) were evaluated in 334 trials. The tested advanced lines are replaced each new cycle, that begin after two years. This process permitted the evaluation of eight to twelve bean lines in each cycle. The area 1 represents 51.8% of the grain production and 40.2% of the common bean grown area in Brazil, showing the larger percentage of final trials for both market classes (45.3% of "carioca" and 45.5% of black) (Tables 1 and 2). The area 2 represents 40.3% of the grain production and 42.2% of the grown area in the country. It presented 40.4% of the "carioca" final trials and 40.1% of the black trials. The area 3 only represents 5.7% of the grain production and 13.5% of the grown area, presenting around 14.0% of the final trials for both market classes. Area 3 has only one growing season per year while the

other areas have at least two. The Brazilian common bean assay network coordinated by Embrapa has been successful to conduct the final trials for cultivars release, what can be verified by the adequate experimental precision of the trials. It has been observed CV% scores, in all regions, lower than 15%, with mean yield potential over 2,100 kg.ha^{-1}, being all trials conducted without the use of fungicides. For the area 1, there was significative increment in grain yield to genotypes of both classes. This will reflect at genetic progress of the breeding program in a growing area where the common bean crop is very important and competitive.

Table 1. Trials (T), mean yield (MY) (kg.ha^{-1}) and experimental coefficient of variation (CV%) by growing areas and by biennial final trial cycles of the Brazilian common bean assay network for the market class "carioca", period from 2003 to 2012.

| Trial cycle | Growing areas | | | | | | | | | Overall | | |
| | 1 | | | 2 | | | 3 | | | | | |
	T[1]	MY	CV	T[2]	MY	CV	T[3]	MY	CV	T	MY	CV
2003/04	31 (12^D-19^R)	2,335	13.6	40 (24^W-16^R)	2,052	15.7	5	2,541	12.2	76	2,309	13.8
2005/06	23 (8^D-15^R)	2,358	15.5	23 (12^W-11^R)	2,257	13.5	7	1,685	11.0	53	2,100	13.3
2007/08	43 (9^D-34^R)	2,215	14.3	28 (16^W-12^R)	2,173	13.8	10	2,330	12.5	81	2,239	13.5
2009/10	34 (12^D-22^R)	2,282	15.3	27 (10^W-17^R)	2,194	16.1	15	2,128	13.9	76	2,201	15.1
2011/12	34 (14^D-20^R)	2,629	13.8	29 (14^W-15^R)	2,137	15.0	15	2,016	11.9	78	2,261	13.6
O[4]/M[5]	165	2,364	14.5	147	2,163	14.8	52	2,140	12.3	364	2,222	13.9

[1]Number of trials realized in the dry and rainy growing seasons in the States of Rio Grande do Sul, Santa Catarina, Paraná, São Paulo and Mato Grosso do Sul. [2]Number of trials realized in the rainy and winter growing seasons in the States of Mato Grosso, Goiás/Distrito Federal, Minas Gerais, Rio de Janeiro, Espírito Santo, Bahia and Maranhão. [3]Number of trials realized in the rainy growing season the States of Sergipe, Alagoas, Pernambuco, Paraíba, Rio Grande do Norte, Ceará and Piauí. [4]Overall. [5]Mean. [D]Dry. [R]Rainy. [W]Winter.

Table 2. Trials (T), mean yield (MY) (kg.ha^{-1}) and experimental coefficient of variation (CV%) by growing areas and by biennial final trial cycles of the Brazilian common bean assay network for the market class black, period from 2003 to 2012.

| Trial cycle | Growing areas | | | | | | | | | Overall | | |
| | 1 | | | 2 | | | 3 | | | | | |
	T[1]	MY	CV	T[2]	MY	CV	T[3]	MY	CV	T	MY	CV
2003/04	30 (11^D-19^R)	2,260	12.9	40 (23^W-17^R)	2,148	14.8	5	2510	11.4	75	2,306	13.0
2005/06	23 (7^D-16^R)	2,477	13.0	20 (9^W-11^R)	2,476	13.9	7	1907	11.4	50	2,287	12.8
2007/08	41 (10^D-31^R)	2,148	14.1	28 (15^W-13^R)	2,188	14.4	9	2606	10.4	78	2,314	13.0
2009/10	37 (10^D-27^R)	2,304	15.7	26 (10^W-16^R)	2,294	14.8	12	1937	13.9	75	2,178	14.8
2011/12	21 (4^D-17^R)	2,481	13.7	20 (9^W-11^R)	1,926	14.1	15	2012	13.1	56	2,140	13.6
O[4]/M[5]	152	2,334	13.9	134	2,206	14.4	48	2194	12.0	334	2,245	13.4

[1]Number of trials realized in the dry and rainy growing seasons in the States of Rio Grande do Sul, Santa Catarina, Paraná, São Paulo and Mato Grosso do Sul. [2]Number of trials realized in the dry and rainy growing seasons in the States of Mato Grosso, Goiás/Distrito Federal, Minas Gerais, Rio de Janeiro, Espírito Santo, Bahia and Maranhão. [3]Number of trials realized in the rainy growing season in the States of Sergipe, Alagoas, Pernambuco, Paraíba, Rio Grande do Norte, Ceará and Piauí. [4]Overall. [5]Mean. [D]Dry. [R]Rainy. [W]Winter.

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