EVALUATION OF DRY BEAN RECOMBINANT-INBRED-LINES FOR AGRONOMIC PERFORMANCE AND CULINARY QUALITY.

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INTRODUCTION.

Major efforts of dry bean breeders are concentrated on the increase of yield and its stability over a wide range of environments. However, consumer preferences and processors' requirements need equal consideration to yield. Seed size, shape, color, and culinary traits related to preparation for consumption, such as water uptake and cooking time, are important parameters, which influence the acceptability of cultivars by consumers. A cultivar of poor quality is likely to be rejected by both consumers and processors, regardless of how agronomically superior it may be. Several studies have indicated genetic variability in dry bean for culinary traits (Castellanos et al.,1995; Shellie and Hosfield,1991; Elia et al. 1997; Boros 2001). The significant variation found for the evaluated traits indicated that they can be changed by selection. The objective of this study was to evaluate the agronomic performance and to assess the seed quality parameters existing among RILs and parental forms.

MATERIALS AND METHODS.

Twenty-one $F_{2:8}$ advanced recombinant inbred lines from cross Prosna x Nida and the parental forms were evaluated. The parental forms showed contrasting cooking time among the registered high yielding cultivars. They differed in earliness and susceptibility to bean bacteriosis, with Nida cultivars being early maturing and tolerant to halo blight. Field trials were planted at two locations. The experiment was arranged in the randomized complete block design in four replication. The determination of seed physical traits, water absorption and cooking time were done in the laboratory. The seed physical traits and the percentage of testa in seed are an average of 10 seeds in 3 replications. The percentage of water absorption of the entries was determined on the basis of replicated samples of 50 seeds. Seeds were soaked in distilled water for 18 hours at 25°C temperature. Bean cooking time was estimated with a 25 - seed Mattson pin-drop cooker (Jackson and Varriano-Marston, 1981). The cooking time was calculated as the time from initial cooking until the time when 80% of pins penetrated seeds in the cooker. Analysis were done in three replications.

RESULTS.

Parental cultivars differed in respect of earliness, TSW, water absorption and cooking time. The mean values for particular traits of RILs were not different from that of parental forms. However wider variation among RILs was observed (table 1 and table 2), suggesting possible transgressive segregation. The differences in water uptake influenced seeds hydration properties, texture, palatability, and cooking time were partially associated with structure of the epicuticular wax layer of seed coat related to the chemistry of the *Asp* and *asp* allele as it was demonstrated in the studies by Bushey et.al. (2002). Cooking time exhibited a wide range from 17 to 28 min that, in general, is rated as medium to good cooking quality compared to dry bean cultivars cultivated in Poland (Boros 2001). Three lines, F 5348, F 5322 and F 5404 were identified that have shorter or equal cooking time, that were also earlier and had slightly improved yield comparing to the maternal parent. The best yielding lines exhibit colored seeds. The relation between cooking time and

Table1. Agronomic traits of parental cultivars and bean RILs

Entry	Vegetation days	Plant height cm	Yield dt ha^{-1}	Protein yield dt ha^{-1}
Prosna	104.8	38.0	29.90	6.33
Nida	99.1	36.0	31.44	6.47
RILs	101.2	36.6	29.98	6.20
Range	98.8 - 104.6	34 - 40	24.27 - 33.68	5.10 - 7.22
CV	1.5	10.5	8.05	9.67
LSD	1.5	5	2.39	0.59

water absorption (r= - 0.60) has indicated that, to some degree, the RILs with higher water absorption were faster to cook. Our data, similar to the earlier reports (Castellanos et al.,1995; Shellie and Hosfield,1991 and Elia et al.,1997), also showed that the accessions with white seed coats and higher water absorption cooked comparatively faster than Nida and lines that with color seed coats. The longest cooking time may be caused by tannin content in the testa. The data on cooking time were similar to those of Elia et al. (1997), who found that low tannin beans cooked faster than beans with high tannin.

Table 2. Seed quality traits of parental bean cultivars and RILs

Entry	TSW. G	Testa %	Protein %	Absorption %	Cooking time min
Prosna	401	7.59	21.7	103.9	18.72
Nida	383	7.20	21.4	98.0	27.19
RILs	404	7.56	21.4	99.9	22.86
Range	333 - 479	6.82 - 8.18	20.0 - 22.3	92.5 - 106.1	16.65 - 28.06
CV	1,6	2.65	4.7	1.1	4.12
LSD	10.5	0.33	1.4	0.54	1.55

The intermating late maturing high yielding and fast-cooking cv. Prosna with early maturing high yielding color seeded cv. Nida provided recombinants with improved yield, earliness and fast-cooking. Further testing is planned to investigate these lines in adverse conditions and their reaction to diseases.

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