aged 15.9 units for dry and 15.2 units for processed color on the L- (lightness) scale of a Model 25 M/L-2, Color and Color Difference Meter (Hunter Associates, Fairfax, VA). These values indicate a satisfactory color retention (95.6%) after processing. Retention values for other commercial black beans cultivars range from 91.1 to 98.7% for T-39 and Domino, respectively. Average values for the washed drained weight ratio (1.28) and hydration ratio (1.95) of canned Blackhawk seed were equivalent to other commercial black beans grown in the same year and location. Blackhawk had an acceptable cooked bean texture (114.2 kg/100 g) compared to other commercial black bean cultivars that ranged from 105.1 to 128.2 kg/100 g.

Blackhawk has been released as an exclusive variety with a research fee assessed on each unit of certified seed sold. Variety protection has been applied for under the Plant Variety Protection Act, Public Law 91-577, with the United States Department of Agriculture. Blackhawk is sold for seed by name only under the certified class. Breeder seed is maintained by the Michigan Agricultural Experiment Station, E. Lansing, MI 48824, in cooperation with the Michigan Foundation Seed Association.

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REGISTRATION OF 'SIERRA' PINTO BEAN

'SIERRA' PINTO BEAN (Phaseolus vulgaris L.) (Reg. no. 84, PI 536542) was developed and released cooperatively by the Michigan Agricultural Experiment Station and USDA-ARS in 1989 as the first upright, midseason pinto bean cultivar. Sierra, formerly known and tested as Michigan State University no. P86299, was derived from a cross made in 1983 as part of a population improvement program to develop upright pinto bean cultivars using a system of phenotypic recurrent selection. The improvement program was initiated in 1980 using as parents nine commercial Type 3 pinto bean cultivars intermated with 16 small seeded architectural Type 2 navy and black bean breeding lines from MSU. After the establishment of the initial base population, the breeding scheme that is described in detail by Kelly and Adams (2) involved the intermatting of only the progeny of F2 selections from one cycle as parents to produce the next cycle of recombinants. Since the system utilized only the cyclic intermatting of upright architectural types with other individuals demonstrating the preferred seed type, no record was kept of the specific parents involved in the crosses. The cyclic intermatting and selection system was continued for four cycles until cycle C1, when individuals were identified which possessed the upright, Type-2 architecture and seed size, shape, and color traits of the commercial pinto bean class. Sierra was selected in 1984 as a single F2 plant selected no. 969. Additional F2 single plant selections were made in the winter nursery program in Puerto Rico (1984-1985) and selection no. 4 was advanced as an F2 row in Michigan in 1985. A single mass selected sample was further advanced as a F1 row in Puerto Rico during 1985 to 1986. Selection no. 83P990-969-04-01 entered yield tests in Michigan as an F2 generation breeding line in 1986 and was coded with the permanent accession no. P86299.

Sierra was tested extensively for yield and agronomic characteristics for four seasons (1986-1989) over 33 locations. Sierra out-yielded the highest yielding commercial cultivar 'Pindak' by 10% and out performed other pinto bean cultivars, namely, 'Othello' and 'Olathe' by 15 to 20%. Sierra is an erect Type 2 pinto bean with a short vine growth habit and is characterized as an archetype according to the description of Adams (1). Under high plant population densities (25 plants m⁻²), Sierra tends toward a single stem growth morphology. This tendency is not influenced by individual pod location within the plant structure, gives an overall tunnel appearance as plants lean on adjacent rows. Sierra is the first bred pinto bean cultivar with a Type 2 growth habit as compared with the prostrate vine Type 3 habit of commercial cultivars. In addition to the upright growth habit, Sierra is 20 cm taller than commercial cultivars and has significantly (P = 0.01) improved lodging resistance with a score of 2.5 as compared to a value of 5.0 for the prostrate Pindak cultivar. The upright architecture, height, pod placement, and lodging resistance all contribute to produce a desirable plant structure with superior adaptation to Michigan's relatively humid conditions. Sierra matures 95 d after planting and is approximately 7 d later than other commercial cultivars. The combination of later maturity and upright architecture contributes to the high yield potential of Sierra and offers the opportunity of direct machine harvesting.

Sierra exhibits moderate resistance to the predominant alpha race of anthracnose disease [caused by Colletotrichum lindemuthianum (Sacc. & Magn.) Scrib.], the most rust resistant pinto bean cultivars available in the U.S. (3). Sierra carries dominant resistance to U.S. rust races 38 to 42, 52 to 57, 59 to 61, and 68 to 70. Sierra is one of the most rust resistant pinto bean cultivars available in the U.S. (3). Sierra exhibits improved field tolerance to injury [caused by the potato leafhopper, Empoasca fabae (Harris)], the Colorado potato beetle, which produces a dense pubescence on the adaxial leaf surface making it less attractive to the insect. Sierra has a seed size of 39 g/100 seeds and is equivalent in size to recognized standard cultivars namely Olathe and Othello. Seed of Sierra is significantly (P = 0.01) larger than the 35 g/100 seed weight of Pindak. The shape of Sierra, although rounder and not as flat as the standard 'UI-111' cultivar, is regarded by industry experts as acceptable. Although the overall color of both the background and mottle are slightly darker than desired, it is no worse than that of other Michigan-grown pinto bean cultivars that exhibit this problem. Sierra has produced a satisfactory canned product in the MSU Food Testing Lab. The hydration and drained weight ratios average 1.9 and 1.3, respectively, and are equivalent to those ratios of the cultivar Olathe. Texture of the canned product varies between locations, ranging from 85 to 119 kg/100 g, but remains equivalent to the standard