

2010 DRY BEAN YIELD TRIALS

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The bean breeding program initiated its second season on the new 250 acre research farm, Saginaw Valley Research & Extension Center near Frankenmuth in 2010. A total of 2994 plots were harvested for yield in 2010 and over 2600 single plant selections were made in the early generation nurseries. Yield trials were conducted at Frankenmuth, Montcalm, East Lansing, and Tuscola counties in addition to 20 acres of early generation nurseries under development in 10 different market classes. At the Saginaw Valley Research & Extension Center, yield trials included 36-entry standard navy test; 64-entry standard black test; 16-entry preliminary black test; 56-entry prelim navy and black test; 36-entry standard GN and 64-entry standard pinto tests; 12-entry standard Tebo test; 16-entry GN PYT test; red/pink test with 30 entries; 42-entry Co-op and regional test that includes pinto, GN, red and pinks; two canning quality trials for CONAGRA: 8-entry navy and 14-entry pinto. At Montcalm; bush cranberry test with 25 entries; kidney test with 42 entries; three white mold tests: national test with 64-entries and two 96-entry pinto trials for genetic studies; one 36-entry certified organic trial in Tuscola county; one potato leaf hopper (PLH) trial with 80-entries on MSU campus; and 375 single row plots as part of the BeanCAP project.

Plots in Frankenmuth suffered from severe drought (3.35 inches rain from planting to harvest) in 2010 that resulted in lower yields (average yield reduction exceeded 50% across nurseries compared to 2009) and some entries remained green and never matured. Normal rainfall for this period is 7". The stress provided the opportunity to select for drought tolerance under these harsh conditions. Plots at Montcalm had adequate rainfall and severe white mold infection developed under supplemental irrigation. As a result the program was able to identify sources of drought resistance in black, navy, pinto, red and great northern market classes and modest levels of white mold tolerance in cranberry and kidney bean trials. All trials except for kidney, cranberry and white mold, organic, and PLH were direct harvested using new self-propelled plot combine. The organic trial planted in the certified organic grower's field in Tuscola county suffered from localized flooding early in the season and as result a portion of the plot was lost to flooding. Conditions favored the development of common bacterial blight (CBB) and the trial proved to be an excellent screen for CBB. Weeds were controlled by cultivation and hand weeding and no additional control for insects was applied. The trial in East Lansing to screen for reaction to potato leaf hoppers (PLH) had adequate moisture and rainfall throughout the season. Insect pressure was minimum so only the caged plots were PLH were trapped proved useful in screening for genetic resistance. The 375 single rows of BeanCAP genotypes grown at East Lansing were hand harvested and notes were taken on adaptation of lines to local conditions. Seed samples were forwarded for nutritional analysis. Two recombinant inbred line populations were advanced to F5 generation in Frankenmuth. The populations were derived from crosses of Zorro with Puebla 152 and Jaguar x Puebla and will be used to study biological nitrogen fixation in black beans. Seed of another RIL population (B89311 x TLP 19) was increased and will be used to study root systems related to drought tolerance in black beans.

The data for all tests are included in an attached section. Procedures and details on nursery establishment and harvest methods are outlined on the first page. Since the data collected on each test are basically the same, a brief discussion of each variable measured is presented below for clarification purposes.

1. Yield is clean seed weight reported in hundredweight per acre (cwt/acre) standardized to 18% moisture content. Dry beans are commercially marketed in units of 100 pounds (cwt).
2. Seed weight is a measure of seed size, determined by weighing in grams a pre-counted sample of 100 seeds, known as the 100-seed weight. To convert to seeds per 100g (10,000/100 seed wt); for example 100-seed weight of 50 converts to 200 seeds per 100 g (used in marketing).
3. Days to flower is the number of days from planting to when 50% of plants in a plot have one or more open flowers.
4. Days to maturity is the actual number of days from planting until date when all the plants in a plot have reached harvest maturity.
5. Lodging is scored from 1 to 5 where 1 is erect while 5 is prostrate or 100% lodged.
6. Height is determined at physiological maturity, from soil surface to the top of plant canopy, and is recorded in centimeters (cm).
7. Desirability score is a visual score given the plot at maturity that takes into consideration such plant traits as; moderate height, lodging resistance, good pod load, favorable pod to ground distance, uniformity of maturity, and absence of disease, if present in the nursery. The higher the score (from 1 to 9) the more desirable the variety, hence DS serves as a subjective selection index.

At the bottom of each table, the mean or average of all entries in a test is given to facilitate comparisons between varieties. In order to better interpret data, certain statistical factors are used. The LSD values refer to the Least Significant Difference between entries in a test at two levels of probability. The LSD value is the minimum difference by which two entries must differ before they can be considered significantly different. Two entries differing in yield by 1 cwt/acre cannot be considered as performing significantly different if the LSD value is greater than 1 cwt/ acre. Such a statement is actually a statement of "probable" difference. We could be wrong once in 20 times ($p=0.05$), on the average, or once in 100 times ($p=0.01$) depending on the level of probability. The other statistic, Coefficient of Variation (CV), indicates how good the test was in terms of controlling error variance due to soil or other differences within a location. Since it is impossible to control all variability, a CV value of 10% or less implies excellent error control and is reflected in lower LSD values. Under the pedigree column, all released or named varieties are **bolded** and always preceded by a comma (,); when preceded by a slash (/), the variety was used only as a parent to produce that particular breeding line.

Expt. 0101: Standard Navy Bean Yield Trial

This 36-entry trial included standard commercial navy bean varieties, and advanced lines from the MSU breeding program, which carry the N-prefix. Yields ranged from 9 to 19.4 cwt/acre with a mean of 14.3 cwt/acre. The trial was fairly uniform but variability was high (CV=12.2%) due to drought and the LSD needed for significance was 2.5 cwt/acre. Only six entries significantly out-yielded the test mean and included new line OAC7-2 from Ontario. The best yielding check varieties Vista, T9905, and Coop 02084. Medalist, and Lightning, ranked near the bottom of the test mean, whereas Avalanche ranked below the mean. These full season varieties did not tolerate extreme drought. Two new breeding line N09174 and B09175 topped the trial but canning tests and seed color characteristics will determine whether these breeding lines be considered for release.

Expt. 0102: Standard Black Bean Yield Trial

This 64-entry trial included the standard commercial black bean varieties and advanced breeding lines. Yields ranged from 11.4 to 19.2 cwt/acre with a test mean of 15.7 cwt/acre, but did not exceed the yield potential of the advanced navy trial. Variability was high in this test, (CV=12.8%) and the LSD was 2.9 cwt/acre. Only one breeding line B09174 significantly out-yielded the test mean and was black seeded selection derived from the top navy line in test 0101. Top yielding checks included Zorro, Loreto Eclipse, T-39, Black Velvet and Shania exceeded the test mean, whereas Jaguar and Condor were below the mean. The test will allow selection for those breeding line with drought tolerance and the elimination of those with no tolerance. Future advances will largely depend on disease reactions and canning quality of the entries.

Expt. 0103: Preliminary Navy and Black Bean Yield Trial

This 16-trial included new navy bean lines along with check varieties developed by breeding programs at TARS and University of Puerto Rico. Yields ranged from 11.9 to 17.5 cwt/acre with a mean of 15 cwt/acre. Variability was high in this 3-rep test (CV=12%) and the LSD was 2.9 cwt/acre resulting in no lines that significantly outyielded the test mean. Many of the lines were derived from Zorro and carry additional disease resistance for CBB, but future advances of many of these lines will largely depend on disease reactions and canning quality of the entries.

Expt. 0104: Preliminary Navy and Black Bean Yield Trial

This 56-trial included new black bean lines along with check varieties. Yields ranged from 4.9 to 18.5 cwt/acre with a mean of 12 cwt/acre. Variability was very high in this 3-rep test (CV=18.9%) and the LSD was 4.5 cwt/acre resulting in only 3 lines that significantly outyielded the test mean. The top yielding entries were very erect and appear to tolerate drought stress. The two black varieties Zorro and Jaguar yielded above the test mean whereas the two navy varieties Vista and Medalist produced dramatically lower yields. The drought stress favored the early efficient maturity of black beans over longer-season navy bean varieties. Future advances of many of the new breeding lines will largely depend on disease reactions and canning quality of the entries.

Expt. 0105: Standard Great Northern Bean Yield Trial

This 36-entry trial included MSU great northern breeding lines and standard commercial check varieties. The test ranged in yield from 9 to 16.2 cwt/acre with a mean yield of 13.2 cwt/acre. Variability was high (CV= 12.7%) resulting in a high LSD value (2.4 cwt/acre) needed for significance. Only one breeding line significantly outperformed the test mean. Line G09303 topped the trial, showed no quality problems and carries resistance to anthracnose (*Co-4²* gene). The check variety Matterhorn performed well and was 2nd in the test. We encountered a major seed quality problem in many GN lines in 2010, very similar to problems seen in 2009. A large number of lines exhibited severe ‘fish-mouth’ seed damage making them commercially unacceptable. This seed condition was previously expressed in some lines in 2009, but appears to be antagonized by the severe drought conditions in 2010. Only those entries with larger seed size, improved dry seed quality and cracking resistance better than Matterhorn will be advanced in 2011.

Expt. 0106: Standard Tebo Bean Yield Trial

This 12-entry trial included tebo bean varieties and MSU breeding lines with similar in seed size to check varieties. The test ranged in yield from 4.3 to 13.4 cwt/acre with a mean yield of 9.2 cwt/acre. Variability was high (CV= 17.2%) resulting in a high LSD value (2.2 cwt/acre) needed for significance. Only three breeding lines significantly outperformed the test mean. The two bush tebo bean varieties were lowest yielding entries on the station in 2010. The varieties did not tolerate drought and they continued to reset pods which aborted due to stress, so the varieties never fully matured. In the trial all indeterminate lines yielded better and these lines will continue to be tested to determine their suitability for release as future tebo bean varieties.

Expt. 0107: Standard Pinto Bean Yield Trial

This 64-entry trial included standard commercial pinto bean varieties and advanced breeding lines from the MSU breeding program with the P-prefix. The trial ranged in yield from 8.4 to 16.8 cwt/acre with a mean of 12.2 cwt/acre. There was greater variability (CV=14.9%) in this trial than in past years and the LSD needed for significance was 2.6 cwt/acre. Only seven entries significantly out-yielded the test mean and these included the varieties La Paz and Othello. The major surprise was the yield of Othello under drought stress. It would appear that its early season maturity helped it avoid the severity of the drought whereas longer season varieties like Lariat and Stampede never fully reached their potential. Breeding line P07863 was the highest yielding pinto in the white mold trials in Montcalm in 2007 2008 and 2009 was 2nd in this test. Other lines from the same cross exceeded the test mean. The new varieties Lariat Stampede, Croissant and Santa Fe yielded above the test mean, and many MSU breeding lines will be discarded due to poor performance in this test. A few lines exhibited the fish-mouth defect but not with the same frequency as the GNs. Only those high-yielding entries with more upright architecture and equivalent canning quality to Othello will be advanced in 2011.

Expt. 0108: Standard Pink and Small Red Bean Yield Trial

This 30-entry trial included small red and pink breeding lines from MSU (R-S-prefix), standard commercial check varieties. The test ranged in yield from 7.9 to 17.7 cwt/acre with a mean yield of 13.4 cwt/acre. Variability was very high (CV=18.6%) due to direct harvesting resulting in a LSD value (3.5 cwt/acre) for significance. Only two lines significantly outperformed the test mean including Merlot and the pink line S07501. Some lines in the trial showed high levels of resistance to CBB but lacked the seed quality of Merlot, whereas others were highly susceptible, similar to Merlot. Check varieties Merlot and Sedona yielded above the test mean, whereas Brooks was lower than the test mean. Included in the test were two new lines from NDSU (prefix NDZ) and both were shorter and earlier. A few breeding lines tended toward a single stem with pods hanging on small branches. Many of these types lost yield as the dry pods shattered in high winds prior to harvest as a result of direct contact with the main stem. Only those small red entries equivalent to Merlot and pink lines equivalent to Sedona in canning quality with BCMV resistance will be advanced in 2010.

Expt. 0109: Combined Midwest Regional Performance Nursery (MRPN) & Cooperative Dry Bean Nursery (CDBN) Yield Trial

The MRPN is conducted annually in cooperation with North Dakota (ND-prefix), Nebraska (NE-prefix) and Colorado (CO-prefix) in order to test new pinto and great northern lines from all four programs and assess their potential in the different regions. The CDBN is a national trial and includes all classes but only medium-sized entries were included in this trial. The 42-entry trial ranged in yield from 7.5 to 21.8 cwt/acre with a mean of 13.6 cwt/acre. Variability was high (CV=18.1%) resulting in a LSD value (4 cwt/acre) for significance. As a result only four lines were significantly higher in yield than the test mean. The top yielding entries were all pintos included La Paz, Othello and Odyssey varieties and breeding line P07863. The test mirrored pinto test 0107 in order of performance as it favored early season varieties which avoided the drought. Among the check varieties, Lariat, Stampede, Sequoia, Max, Montrose, Matterhorn and Buster yielding above the test mean, whereas Coyne, Santa Fe, Jackpot, yielded below the test mean. The longer-season vine cranberry varieties Chianti and Bellagio did not tolerate drought. Many of the lower yielding entries did not tolerate drought stress and some remained green and never fully matured (100d). This cooperative trial continues to be valuable as it allows an evaluation of potential new lines prior to release in other states and a number of full-season, high-yielding pinto bean lines were identified in 2010.

Expt. 0210: Standard Bush Cranberry Bean Yield Trial

This 25-entry trial was conducted on the Montcalm Research Farm to compare new and standard bush cranberry bean varieties under supplemental irrigation (5x total 3.2"). Yields ranged from 20.8 to 35.4 cwt/acre with a mean of 28.7 cwt/acre. Variability was very high (CV=15.3%) in this test due to severe white mold pressure and the LSD needed for significance was high (6.2 cwt/acre). As a result two lines significantly outyielded the test mean. White mold was rated on 1-9 scale and ranged from low of 1.3 to high of 9.1 for variety Krimson. Despite the very high levels of white mold pressure, a family of full-sibs originating from cross X03516/C99804 all showed relatively high yield combined with lower disease ratings (<4). The same lines exhibited similar performance in 2009.

Check varieties, Capri, T. Hort, yielded above the test mean, whereas Chianti, Crimson, Bellagio and Hooter yielded below the test mean and exhibited high levels of white mold. Two vine cranberry lines Bellagio and Chianti were also severely infected with white mold and should not be grown under this irrigated management system. Only those entries equivalent to Capri in seed size with improved canning quality will be advanced in 2011.

Expt. 0211: Standard Kidney Bean Yield Trial

This 42-entry trial was conducted on the Montcalm Research Farm to compare the performance of standard and new light red kidney (LRK), dark red kidney (DRK) and white kidney (WK) bean varieties from MSU and CDBN under supplemental irrigation (5x total 3.2”). Yields ranged from 21.2 to 36.8 cwt/acre with a mean of 29.6 cwt/acre. Variability was moderate (CV=12.1%) resulting in a large LSD value (5.1 cwt/acre) needed for significance. Only two entries significantly outyielded the test mean, included WK K08961 and three checks Chinook, Red Hawk and CELRK. K08961 was also the top-yielding entry in 2009, yielding 4 cwt/a more than the next entry, while the same line ranked 4th in 2008. A new early-season selection from Beluga (K10902) yielded 3cwt more than Beluga and was 5-days earlier. White mold was not as severe in this test, compared to cranberry test and ranged from 0.9 to 6.0. Early season check varieties CELRK seemed to avoid the worse infections. Redcoat, Montcalm also yielded above the test mean, whereas Beluga and Badillo yielded below the test mean. Three LRK breeding lines from Puerto Rico, T21-Badillo T-27 and T-28 which showed potential in 2009 were lower yielding and Badillo never fully matured (105d). Since canning quality is vital in kidney beans, only those DRK lines equivalent in canning quality to Red Hawk, LRK lines equal or better than CELRK and WK lines equivalent to Beluga will be advanced in 2011.

Expt. 0212: National White Mold Variety Yield Trial

This 64-entry trial was conducted at Montcalm to evaluate a range of diverse dry bean varieties and breeding lines for reaction to white mold under natural field conditions. Genotypes included commercial navy and black bean cultivars, elite MSU lines, and new sources of white mold resistance entered as part of the National *Sclerotinia* Initiative (NSI) Nursery. Lines in the National trial were developed at MSU, OSU, CSU, Cornell, NDSU and USDA-WA. Entries were planted in two row plots with two rows of susceptible spreader variety Beryl between plots. Supplemental overhead irrigation was applied 6 times for a total of 3.7” to maintain adequate levels of moisture for favorable disease development at the critical flowering period. Natural white mold infection occurred across the entire trial and was extremely severe in certain plots. White mold was rated on a per plot basis on a scale of 1 to 9 based on disease incidence and severity where 9 had 90+% incidence and high severity index. White mold ranged from 33 to 94% and pressure was higher than in past years. The test ranged in yield from 8 to 33 cwt/acre with a mean yield of 23.6 cwt/acre. Variability was high (CV=17.6%), thus a high LSD value (6.8 cwt/acre) was needed for significance. As a result only 4 lines significantly outyielded the test mean but overall yields were similar in 2009. The top group included new pinto 37-2 from USDA-WA along with pinto line P07863 that was the top yielder in 2007, 2008 and 2009 and two small red lines R08512 and R08516. The P07863 line continues to demonstrate superior yield performance under white mold pressure. Small red and navy lines from NDSU (prefix ND) did well as did Zorro black bean. The major surprise was high yielding of Beryl the susceptible check in 2010. Santa Fe, Jaguar, Merlot and Medalist performed above the test mean, whereas all high-

yielding pintos La Paz, Lariat, Stampede, performed below the mean due to white mold pressure. The same group also included Condor, Sedona, Eclipse, Capri, Bunsu and Matterhorn. K08961 white kidney that was in top group in 2009 dropped below test mean in 2010 due to high white mold pressure. White mold resistance in G122 cranberry broke down (39%) in 2010 as in 2009 and G122 only yielded 14.5 cwt or 7 cwt/a less than the new bush cranberry line C08709. This was the first year that five of entries in NSI trial yielded above the test mean as many of the standard entries from NSI trial were among the lowest yielding lines in the past. Highly resistant VCW54 from Idaho was the lowest yielding entry in 2010. Past experience using low-yielding white mold resistant germplasm as parents has not proved useful in breeding for white mold resistance. Overall the trial confirmed results from previous years (exception Beryl) and this trial will continue to be a vital part of the breeding effort to improve tolerance to white mold in dry beans.

Expt. 0213: White Mold Genetic Yield Trial- AP630

A 4-replicate 96-entry trial was conducted at Montcalm to evaluate the genetic resistance to white mold in the recombinant inbred line (RIL) pinto population AP630 developed from the cross of AN 37/P02630. The cross was made to introduce white mold resistance from AN 37 into the upright pinto line P02630 from the MSU program and this is the four year to evaluate this population. Natural white mold infection occurred across the entire trial and ranged from 19 to 92% so disease pressure was high due to the cool wet season and additional 6 irrigations for a total of 3.7 inches to promote disease development. The test was planted in the same arrangement as test 0212. Yield ranged from 16.2 to 32.1 cwt/acre with a mean yield of 25.7 cwt/acre. Variability was high (CV=16.2%), and a LSD value (6.8 cwt/acre) was needed for significance. Due to the high variability, no lines significantly outyielded the test mean. Top entry in past 3-years was pinto line P07863, but it dropped to 30th position in 2010. This was a major surprise as it was the second entry in the adjacent test 0212, but white mold rating of 81% was noted in this trial. One parent AN 37 yielded above the test mean whereas other parent was below the test mean and many of the lowest yielding entries were similar in both years. A genetic mapping experiment to find markers associated with white mold resistance and high yield under white mold pressure in this population is underway.

Expt. 0214: White Mold Genetic Yield Trial- AP647

A second 4-replicate 96-entry trial was conducted at Montcalm to evaluate the genetic resistance to white mold in the recombinant inbred line (RIL) pinto population AP647 developed from the cross of AN 37/P02647. The cross was made to introduce white mold resistance from AN 37 into the upright pinto line P02647 from the MSU program and this is the second year to evaluate this population. Natural white mold infection occurred across the entire trial and ranged from 25 to 92% so disease pressure was high due to the cool wet season and additional 6 irrigations for a total of 3.7 inches to promote disease development. The test was planted in the same arrangement as test 0213. Yield ranged from 22.9 to 36.9 cwt/acre with a mean yield of 29.1 cwt/acre and yielded ~4 cwt/a more than test 0213. Variability was high (CV=15.6%), and a LSD value (7.4 cwt/acre) was needed for significance. Due to the high variability, only two lines significantly outyielded the test mean. One parent yielded above while other yield below the test mean. A genetic mapping experiment to find markers associated with white mold resistance and high yield under white mold pressure in this population is underway. Elite lines will be included in standard pinto bean yield tests in 2011.

Expt. 0116: Preliminary Great Northern Bean Yield Trial

This 18-entry trial included new MSU great northern breeding lines and standard commercial check varieties. The test ranged in yield from 5.1 to 18.5 cwt/acre with a mean yield of 10.3 cwt/acre. Variability was high (CV= 23.5%) in 2-rep experiment resulting in a high LSD value (4.3 cwt/acre) needed for significance. Only one breeding line G10409 significantly outperformed the test mean. The check variety Matterhorn yield above the test mean. We encountered a major seed quality problem in some of GN lines that appears to be antagonized by the severe drought conditions in 2010. Only those entries with larger seed size, improved dry seed quality and cracking resistance better than Matterhorn will be advanced in 2011.

Expt. 0117: Commercial Navy Bean Yield Trial

This trial was conducted to test current commercial navy bean varieties and evaluate their production potential and canning quality in Michigan. The trial was conducted at a second location in Michigan and at two other locations in ND and NE. The 8-entry trial ranged in yield from 7.6 to 19.1 cwt/acre with a mean of 12.6 cwt/acre. Variability was high (CV=18.1%) resulting in a high LSD value (3.2 cwt/acre) for significance. Due to the small number of entries only one line was significantly higher in yield than the test mean. The top yielding entry Schooner appeared to tolerate drought better due to its earlier maturity. The full-season variety Medalist did not perform well in 2010 and was 9 cwt/a less than Schooner. Among the other varieties, Norstar was the lowest yielding. All entries will be canned at MSU and evaluated by Conagra brand team for suitability in their canned products.

Expt. 0118: Commercial Pinto Bean Yield Trial

This trial was conducted to test current commercial pinto bean varieties and evaluate their potential and canning quality in Michigan. The trial was conducted at a second location in Michigan and at two other locations in ND and NE. The 14-entry trial ranged in yield from 12.1 to 17.8 cwt/acre with a mean of 14.9 cwt/acre. Variability was high (CV=15.7%) resulting in a high LSD value (3.3 cwt/acre) for significance. Due to the small number of entries no line was significantly higher in yield than the test mean. The top yielding entry P07863 appeared to tolerate drought better despite its full-season maturity. This trial mirrored pinto test 0107, with La Paz and Othello in the top group. The surprise was the full-season variety Stampede in this group along with Poncho (not previously tested). Lariat did not perform well in 2010, below Maverick and Santa Fe, bred for white mold tolerance (test 0212) showed no tolerance to drought either. All entries will be canned at MSU and evaluated by Conagra brand team for suitability in their canned products.

Expt. 0915: Organic Dry Bean Yield Trial, Tuscola County

A 36-entry navy and black trial was conducted in a commercial organic grower's fields in Tuscola County near Unionville to evaluate new breeding lines, current and old varieties for potential under this management system. Heavy rainfall in late June resulted in localized flooding, resulting in low stands and damaged plots which resulted in variable yields. Yields ranged in yield from 6.1 to 23 cwt/acre with a mean of 15.1 cwt/acre. Variability was extremely high (CV=37.1%) resulting in a high LSD value (7.9 cwt/acre) for significance. Due to the high variability only one line was

significantly higher in yield than the test mean which prevents a true comparison of the yield potential of the 36-entries. Since organic growers plant later than conventional growers as they wait to cultivate the first flush of weeds in early June, we wanted to evaluate older early-season varieties that could be planted later. Despite a planting date of June 17, the early-season varieties performed very poorly and grouped at the bottom of the test. Organic growers should plant the best full-season commercial varieties available and not consider the lower yield older varieties like Seafarer and Albion as their yield potential is inferior. The early wet conditions favored the development of CBB which was rated on 1-5 scale (5=very susceptible). The test proved very useful screen for CBB and many of the new high-yielding MSU showed excellent levels of tolerance to CBB with scores under 1.0. Since organic growers may choose to save seed as organic seed is not widely available, resistance to seed-borne CBB would be an important criterion in their selection of bean varieties to grow. The trial will be repeated in 2011.

Expt. 0420: Potato Leafhopper Trial – PLH.

A single 80-entry trial was conducted in East Lansing to compare reaction of RIL population to natural infection with PLH. The population was developed from cross of Matterhorn with EMP507 line selected in Puerto Rico with resistance to PLH. The trial was rated for reaction to PLH based on PLH count and leaf curl symptoms – typical damage caused by the pest. Yield ranged from 14.4 to 36.6 cwt/acre with a mean of 26.7 cwt/acre. Variability was high (CV=22.8%), and a LSD value of 9.9 cwt/acre was needed for significance. As a result only one line significantly exceeded test mean. A number of lines exceeded the performance of the Matterhorn parent and will be evaluated further. Leaf curl ratings ranged from low 1.3 to 4.3 but showed a high CV=22.6%. Likewise the PLH count showed an unsatisfactory high CV=62.2% which suggests that there is too great variability in this measurement to use this as a useful screening method. The trial will be repeated in the growth chamber where there is better control of the numbers of insect pests and in field cages where the same numbers of insects/nymphs can be placed on the bean plants being evaluated. Tolerance to PLH would be useful trait for organic bean producers who cannot apply conventional insecticides to control this insect pest.

Early Generation Breeding Material grown in Michigan in 2010

F3 through F5 lines

Navy and Black - 1176 lines
 Pinto - 551 lines
 GN - 90 lines
 Pinks and Reds - 127 lines
 Kidneys (DR, LR, White) - 196 lines
 Cranberry (bush, vine) - 337 lines
 Yellow Eye – 6 lines
 Flor De Mayo – 50 lines

F2 populations

Navy and Black -128 populations
 Pinto - 130 populations
 GN - 65 populations
 Pinks and Reds - 167 populations
 Kidneys (DR, LR, White) – 87 populations
 Cranberry (bush, vine) – 109 populations

F1 populations: 667 different crosses among nine contrasting seed types.