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SCREENING EARLY MATURING SOYBEAN (*Glycine max* L.) GERMPLASMFOR RESISTANCE TO THE SOYBEAN APHID (*Aphis glycines* MATSUMURA)

presented by

Clarice Mensah

has been accepted towards fulfillment
of the requirements for the

M.S. degree in **Plant Breeding and Genetics Program**

Major Professor's Signature

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By

Clarice Mensah

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ABSTRACT

SCREENING EARLY MATURING SOYBEAN (*Glycine max* L.) GERMPLASM FOR RESISTANCE TO THE SOYBEAN APHID (*Aphis glycines* MATSUMURA)

By

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Since 2000 the soybean aphid (*Aphis glycines* Matsumura) has become a major pest of soybean [*Glycine max* (L.) Merr.] in the USA. Currently none of the commercial soybean varieties show resistance to the aphid and there are no sources of resistance reported in early maturing soybean germplasm in the USA. The objective of this study was to identify sources of resistance to soybean aphid from early maturing soybean germplasm and to determine the type of resistance. Over a two year period, 2,147 early maturing soybean accessions from maturity group (MG) 0 to III, originally from northern China, were screened for aphid resistance in the greenhouse and in field cages. The plants were hand-inoculated and aphid populations were evaluated 10 days after inoculation. A damage index (0-100%) was calculated for each accession. After two years of screening and confirmation in choice tests, four accessions, PI567543C, PI567597C, PI567541B, and PI567598B, in MG III were found to be resistant to the soybean aphid. Two of these accessions, PI567541B and PI567598B, possessed antibiosis resistance preventing the aphids from reproducing on the plants in a no-choice study. These resistant sources can be used to develop commercial varieties with aphid resistance for the North Central states where soybean varieties of MG 0 to III are cultivated.

DEDICATION

To my husband Doe and my little girl Volta Elolo Adovor. And also to the Mensah Family in Kumasi - Ghana

ACKNOWLEDGEMENTS

I would like to gratefully acknowledge the guidance of my major advisor Dr. Dechun Wang and the members of my guidance committee, Dr. Chris DiFonzo and Dr. Dave Douches. I also appreciate the immense help given to me by my coworkers in the Soybean Breeding Program and the Field Crops Entomology Laboratory in the inoculation and data collection aspects of this research. Many thanks goes to Dr. Randall Nelson curator of the USDA Soybean Germplasm Collection in Urbana, Illinois for making the germplasm we screened readily available. Finally I wish to thank Project GREEEN (Generating Research and Extension to meet Economic and Environmental Needs) and the Michigan Soybean Promotion Committee for providing the funds which supported this research.

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INTRODUCTION AND LITERATURE REVIEW

Soybean is the leading oilseed crop produced and consumed worldwide (Hymowitz 2004). In the past half century the United States of America (USA) has been the world's leading producer. In 2003 alone, the USA produced 35% (65.8 million Mt) of the world's total soybean (FAOSTAT 2004). Soybean has many insect pests limiting its production, including the soybean aphid. A native to eastern Asia, the soybean aphid was not reported in the USA prior to July 2000. The consensus among soybean researchers is that the soybean aphid was present but remained undetected for several years before 2000 (Ragsdale et al. 2004). Since then, the insect has rapidly spread to the major soybean production areas in the USA and Canada (Plant Health Initiative, 2004). In 2000, the aphid was found in Michigan, Indiana, Illinois, Minnesota, Wisconsin, Iowa, and Missouri. In the following two years, the aphid spread to other states including Ohio, New York, Pennsylvania, Delaware, Virginia, West Virginia, Kentucky, Kansas, Nebraska, South Dakota, and North Dakota. In 2003, severe aphid infestation was reported in many of these states. Outbreaks have been severe in the northern part of the Midwest and in Ontario, particularly in 2001 and 2003.

In the USA, soybean aphid research is still in its early stages. The aphid was first found in the USA in 2000 and annual infestations have been unpredictable (Steffey and Gray 2004). The only available method of controlling soybean aphids in the USA is to spray insecticides. Although the use of insecticides can be a quick and easy way to control aphids, the ideal time to spray has not yet been well defined. Insecticides also have many adverse effects, such as killing the natural enemies of aphids, and raises

chemical use and soybean production costs (Gao 1991). Aphid populations may resurge when applications of insecticides are poorly timed. Developing soybean varieties that are resistant to the aphid is a long-term solution to the problem.

To develop aphid resistant varieties, sources of resistance must be identified. Sources of resistance to the soybean aphid are reported in China. In the late 1980's, two highly resistant varieties were found among 181 varieties screened (Fan 1988); in 1991, resistance was also reported in Chinese soybean germplasm (Sun et al. 1991). The type of resistance, antixenosis (non-preference) or antibiosis, was not indicated in these studies. Antixenosis is nonpreference of insects for a host plant (Korgan and Ortman 1978). Antibiosis includes all adverse effects on an insect's life history after a resistant host plant has been used for food (Painter 1951). Knowing the type of resistance is important to fully understand and utilize resistant accessions in a breeding program. Hill et al. (2004) have recently reported 3 lines with resistance to soybean aphid. PI 71502 (MG IV) has antixenosis and the cultivars Dowling (MG VIII) and Jackson (MG VII) were reported to have antibiosis resistance.

At the time our research was initiated in 2002, there were no known sources of host plant resistance in the USA. The USDA Soybean Germplasm Collection at Urbana, Illinois contains over 6,278 accessions of Chinese origin (E. Peregrine personal communication), and we assume that some resistant accessions exist in this collection. Therefore, we screened soybean germplasm collected from China to identify sources of resistance from this collection.

The objectives of this study were to: (i) screen soybean germplasm from northern China in the USDA Germplasm Collection to identify sources of resistance to soybean

aphids in early maturity groups; and (ii) determine the resistance type of the identified sources.

THE SOYBEAN

Soybean, *Glycine max* (L.) Merr., (2n=2x=40) combines in one crop both the dominant world supply of edible vegetable oil, and the dominant supply of high-protein feed supplements for livestock. Other fractions and derivatives of the seed have substantial economic importance in a wide range of industrial, food, pharmaceutical, and agricultural products (Johnson 1987). The USA is the principal world supplier of soybeans followed by Brazil. The USA, Brazil, Argentina, and China account for over 90 percent of world soybean production. (Soy Stats 2004). As a source of protein, soybean is often less expensive on a cost per kilogram basis compared to animal protein (Hymowitz and Newell 1981)

Soybean is a papilionoid legume belonging to family Fabaceae. The genus *Glycine* is divided into two questionably distinct subgenera: *Glycine* and *Soja*. The first consists of six or seven perennial species primarily from Australia. The second consists of three annual species from Asia: *Glycine max*, *Glycine soja*, and *Glycine gracilis*. The first species is the cultivated soybean, the second is the wild form of the soybean, and the third the weedy form of the soybean (Palmer et al., 1996).

THE SOYBEAN APHID

The soybean aphid (*Aphis glycines* Matsumura) belongs to the Family Aphididae and is a small, light yellow or yellowish-green insect with two distinct black cornicles and pale tail (cauda). Its body color, black cornicles, and colonization of soybean (and buckthorn) distinguish it from other aphid species (Voegtlin et al. 2004). Adults of the

soybean aphid may or may not have wings. Adult soybean aphids are about 1/16th of an inch (2 mm) long. The young look much like miniature wingless versions of the adults. Winged aphids have a black head and thorax.

Life History

The soybean aphid displays a complex life cycle (heteroecious and holocyclic) with alternation of sexual and asexual generations and host plants (Ragsdale et al. 2004). It utilizes two very different types of host plants in the USA, the buckthorn (*Rhamnus spp*) and soybean plants. The observed life history of soybean aphid in North America is similar to that observed in China and Japan, with the exception of the primary (over-wintering) hosts. In China and Japan, the most common over wintering hosts are *Rhamnus davurica* Pallus and *Rhamnus japonica* Maxim (Takahashi et al., 1993). In North America, various buckthorn (*Rhamnus*) species are used as primary hosts (Voegtlin et al., 2004), particularly common buckthorn (*Rhamnus cathartica*).

The soybean aphid over winters as an egg on the buckthorn. In spring, the wingless mothers hatch from the egg and produce colonies of wingless females. These in turn produce a third generation of aphids that includes winged emigrants. The winged females fly to soybeans, the summer host for the aphid. For the remainder of the summer, colonies of wingless and winged females are produced. All asexual generations are entirely female and are clones of the mother. Numbers of aphid generations range from 10 to 22 per year in China (Li et al. 2000). Wu et al. (2004) reported a total of 18 generations per year in China, with 15 of these generations occurring on soybean. In the study conducted by Wu et al., soybean aphid populations peaked in late vegetative to early reproductive stages with a second smaller peak as plants neared physiological

maturity. Generation times range from 2 to 16 days and decline with temperature (Li et al. 2000). Wingless and winged female aphids produce an average of 58 and 38 nymphs, respectively, at 26°C (Li et al. 2000). Winged females (gynoparae) and males appear in the fall as the temperature decreases and plant conditions deteriorate. They migrate to buckthorn where the gynoparae produce wingless females called oviparae. The males mate with the oviparae, which lay over-wintering eggs. The life cycle repeats the next spring. Winged aphids play a vital role in expanding the range of dispersal within and among fields and in migration between alternative host plants. Crowding of wingless adults and poor host quality induce winged aphid production (Lu and Chen 1993).

In many parts of the North Central United States, e.g., northern Minnesota, North Dakota, and Ontario, Canada, *A. glycines* is typically not found before early July, suggesting that these fields are colonized by winged individuals that emigrate from other soybean fields rather than by individuals that come directly from over-wintering hosts. When soybean is in vegetative growth, soybean aphid colonies are commonly found at the growing points, e.g., partially expanded young trifoliate, petioles, and stems. When plants begin to flower, set pods, and develop lateral branches, soybean aphids tend to become more widely dispersed on the plant and can be found on the underside of mature leaves, on lower stems, lateral branches, petioles, and pods. Dense colonies are sometimes tended by ants.

The movement to and from summer and winter hosts seems to be a biological "bottleneck" that has the potential to limit the ability of the soybean aphid to over winter successfully. Fall migration can be challenged by crop phenology. In some years, much of the soybean is harvested by the mid-September. These fields would have begun

senescing and dropping leaves sometime before harvest, so only aphids colonizing stems and pods would survive until those parts of the plant are too desiccated to support further development. If soybean senescence precedes the development of gynoparae, the females that migrate from secondary to primary hosts to produce the sexual females and males, there is little possibility of over-wintering by the aphid in that area. Late-planted or double-cropped soybean may be the primary source of gynoparae and males. Data indicate that the soybean aphid seems to have adapted to the North Central United States. It has expanded its host range to use local *Rhamnus* species as over-wintering hosts. The aphid has also overcome challenges to synchronize its life cycle with the senescence of soybean in the fall and the relative late emergence of the crop in the spring (Wu et al., 2004). Several factors affect outbreaks of soybean aphids including environmental factors, over-wintering success, cultural practices, natural enemies, and the synchronization of soybean and aphid development (Wu et al. 1999). Rainy weather helps to reduce populations of soybean aphid. Raindrops may knock aphids off plants and high humidity increases the chance for fungal diseases to infect the insects (Wu et al. 2004).

Symptoms and Damage

The soybean aphid is the only aphid in North America that develops large colonies on soybeans. Plant damage occurs when large numbers of aphids remove significant amounts of water and nutrients as they feed on leaves and stems, causing leaves to wilt, curl, yellow, and even drop. Other symptoms of direct feeding damage include plant stunting, poor pod fill, reduced pod and seed counts, smaller seed sizes, and nutrient deficiencies, resulting in overall yield and quality reduction (DiFonzo and Hines,

2002). Significant yield loss (8-25%) occurs when aphid densities peak at flower initiation. Honeydew, a sticky substance excreted by soybean aphids onto the leaves, leads to the development of sooty mold, which affects photosynthesis and results in yield and seed quality loss (Chen and Yu 1988). During the feeding process, soybean aphids are capable of transmitting viruses including soybean mosaic, alfalfa mosaic, mungbean mosaic, peanut mosaic, and bean yellow mosaic virus (CAB International 2001). These viruses commonly occur together and form a disease complex that leads to plant stunting, leaf distortion and mottling, reduced pod numbers and seed discoloration (Glogoza 2002). Soybean mosaic virus (SMV), transmitted in a nonpersistent manner and causing high yield loss, is spread mainly by aphid feeding. Epidemics of SMV are dependent not only on the initial virus source but also on the abundance and development of aphid vectors. Occurrence of winged aphids in soybean fields is closely associated with the incidence of SMV (Quimio and Calilung 1993).

HOST PLANT RESISTANT MECHANISMS

Resistant varieties of crop plants play an important part in controlling many insect, mite and nematode pests. When resistant varieties are used, fewer applications of insecticides are usually needed to control insect pests than when susceptible varieties are planted. Parasites and predators can be more effective on resistant than on susceptible varieties. For instance, the European corn borer is more effectively controlled by a protozoan parasite, *Nosemia pyrausta*, on partially resistant maize varieties than on susceptible plants. Pesticides are too expensive to use on low value crops. It is therefore often very desirable to develop resistant varieties that do not need to be supported by chemical control measures (Russell 1978).

From an economic point of view, the use of insect-resistant cultivars in pest management programs offers growers the advantage of genetically incorporated insect control for the cost of the seed alone (Renwick, J. 1983). Resistance to insects is composed of genetically inherited qualities that result in a plant of one cultivar or species being less damaged than a susceptible plant, which lacks these qualities. Plant resistance to insects is always relative and the degree of insect resistance is based on comparison to the susceptible plants that are more severely damaged under similar test conditions. This practice is necessary, since resistance is influenced by environmental fluctuations occurring over both time and space. The importance of developing crop plants that are resistant to major insect pest has created the need for examination of the mechanism involved in resistance. The widely recognized classification proposed by Painter (1951), provides an acceptable breakdown of the possible bases of resistance: nonpreference, antibiosis, and tolerance. Nonpreference refers to behavioral responses of insects to a plant, whereas antibiosis and tolerance refer to plant characteristics. Kogan and Ortman (1978) suggested the term antixenosis to describe the plant properties responsible for nonpreference.

According to Smith (1989), if a plant deters feeding by an insect, the mechanism of resistance may be either antixenosis or antibiosis. The main difference between these two types of resistance is whether the insect is completely prevented from feeding, thus starving to death (antibiosis) or will eventually feed on that plant when given no choice (antixenosis). Often there is an overlap between the antibiosis and antixenosis types of resistance. The choice of host plants is affected by a vast array of positive and negative factors. Positive factors include physical stimuli, attractants, feeding stimulants and

oviposition stimulants. Negative factors include physical barriers, repellents and feeding deterrents. Whether a potential host plant is selected by an insect often depends on a delicate balance that may be tipped in either direction by the presence or absence of one of these factors.

Complex types of resistance and combinations of different types of resistance can be expected to give more complete and durable control than one simple type. For example, a resistant variety that expresses antibiosis and tolerance to an insect will give an excellent and durable control. On the other hand, such a combination might be difficult to select for and manage in a breeding program.

Antixenosis or nonpreference

Antixenosis refers to the undesirability of plant to an insect, resulting in avoidance by the insect. Both antixenosis and non-preference denote the presence of morphological or chemical plant factors that adversely change insect behavior, resulting in selecting of an alternative host plant. Physical barriers such as thickened plant epidermal layers, waxy coatings on leaves and stems or trichomes may force insects to abandon their efforts to feed on an otherwise palatable host plant. Antixenosis in plants may also be due to the possession of unique phytochemicals that repel or deter insect herbivores from feeding or oviposition.

Antibiosis

Antibiosis refers to the unsuitability of a plant as food. This is the type of plant resistance to insects that describes the negative effects of a resistant plant on the biology of an insect attempting to use that plant as a host. Both chemical and morphological plant defenses mediate antibiosis, and the effects on resistant plants range from mild to lethal.

A chronic effect of antibiosis leads to mortality in older larvae, pupa and adults. Individuals surviving the direct effects of antibiosis may also suffer reduced body size and weight, prolong periods of development in the immature stages and reduced fecundity as surviving adults. Antibiosis occurs because of the presence of plant allomones or the absence of plant kairomones. Resistant cultivars may lack the proper quantities of basic insect nutrients or contain phytochemicals that are toxic to insects, or have high concentrations of structural plant substances such as lignin and silica that reduce insect digestion.

Tolerance

The tolerance mechanism of resistance is measured by the ability of plants to withstand or recover from damage caused by insect infestation, which is equivalent to what is required to damage a susceptible cultivar. Tolerance is determined by inherent genetic capability to outgrow or recover after insect damage. From an agronomic point of view, the plants of a tolerant cultivar have higher yield. Tolerance often occurs in combination with antixenosis and antibiosis components of resistance.

SCREENING FOR INSECT RESISTANCE

Screening for insect resistance under natural conditions is a long-term process. In the early stages of a plant resistance program, field populations of pest insects are normally used by researchers to evaluate plant materials. However, field evaluation of plant materials has some problems that may affect the search for resistance. Differences in insect populations over space and time makes it difficult to identify reliable and stable sources of resistance in natural conditions. It is therefore necessary to develop choice and

no-choice screening techniques where the test cultivars can be subjected to a uniform insect pressure (Ananthakrishnan 2001).

Caging insects with test plants is one of the most dependable methods of screening for insect resistance. It is possible to maintain uniform insect pressure on test entries and also test at the same stage of development. Not only does the cage keep the insect from migrating it also keeps natural enemies away from the insects. Caging tests can be carried out under field or greenhouse conditions, and the cages can be developed to cover whole plants or plant parts (Smith 1989 and Smith et al. 1994).

MATERIALS AND METHODS

PLANT MATERIALS

Soybean plant introductions (PI) from MG 0 to III were obtained from the USDA Soybean Germplasm Collection in Urbana, Illinois. A total of 2,147 PIs were screened in 2002 and 2003 (Appendix A and B). Accessions originally from northern China were selected, as the climatic conditions are similar to those in the northern USA, where the soybean aphid over winters. 'Williams 82' (Appendix A, Entry 1047) was included as a susceptible check and three resistant genotypes, 'Dowling', 'Jackson', and PI 71506 (Appendix B, Entries 915, 1107, 1108) (G. Hartman, personal communication, 2002 and 2003), were included as resistant checks (Hill et al. 2004). Both the susceptible and resistant checks were obtained from Dr. Glen Hartman, USDA-ARS at Urbana, Illinois.

All PIs and checks were first evaluated in choice tests (Davis 1985) in which the aphid fed on the genotypes they preferred to identify PIs possessing either antixenosis or antibiosis. The resistant PIs were then re-evaluated in no-choice tests (Davis 1985) in which aphids were confined on plants to identify PIs with antibiosis resistance.

LOCATION OF EXPERIMENT

All experiments were conducted at Michigan State University (MSU), East Lansing, MI. Soybean aphids were obtained from nearby naturally infested soybean fields for summer fieldwork, and from a colony maintained in growth chambers at the Field Crops Entomology Laboratory at MSU for winter greenhouse work. The experiments were set up as a randomized complete block design with two replications.

SCREENING OF GERMPLASM

Summer Field Screening - Choice Test

Two experiments were carried out in 2002 and 2003 to screen soybean germplasm for aphid resistance. Summer plantings were done at the Agronomy Farm, MSU, in 12.2 x 18.3 m polypropylene cages (Redwood Empire Awning Co., Santa Rosa, CA), that are aphid-, and predator - proof.

In 2002, 1,043 PIs, a susceptible check Williams 82, and an anonymous resistant check provided by Dr. Glen Hartman at the USDA-ARS at Urbana-Champaign were evaluated. Five seeds were planted per accession, for a maximum of five plants per accession after emergence. The plot length for each accession was 0.30 m long. After emergence of the first trifoliate, two plants per accession were inoculated with two aphids each, using a camel-hair brush. Aphids were obtained from naturally infested fields on the agronomy farm. The aphids were left to multiply and move among plants. The plants were removed from the cage at the end of the experiment; the experiment was re-randomized and re-planted. Infestation was done as described for the first planting.

In 2003, 1,103 PIs, three resistant checks Dowling, Jackson, and PI 71506 and a susceptible check Williams 82 were evaluated in two field cages simultaneously. The method of inoculation, plot sizes, and evaluation procedures were the same as for the 2002 field screening.

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In 2002, 1,043 PIs, a susceptible check Williams 82, and an anonymous resistant check provided by Dr. Glen Hartman, USDA-ARS at Urbana, Illinois, were evaluated in a field cage. The PIs and checks were planted on June 26. Five seeds per accession were planted in a plot 0.30 m long. After emergence of the first trifoliate, two plants per accession were inoculated with two aphids each using a camel-hair brush. Aphids were obtained from naturally infested fields on the Agronomy Farm, MSU. The aphids were left to multiply and move among plants.

In 2003, a new set of 1,103 PIs, three resistant checks Dowling, Jackson, and PI 71506 and a susceptible check Williams 82 were evaluated in two field cages. In each cage, a complete set of the PIs plus the checks were planted as a randomized complete block, which is considered as one replication of the test. The planting was carried on May 30 in one cage and on June 6 in the other cage. The methods of inoculation plot sizes, and evaluation procedures were the same as for the 2002 field screening.

Winter Greenhouse Screening - Choice Test

A winter screening was carried out in a large greenhouse with temperatures between 22 and 25 ^{0}C to verify the results obtained in the field in 2002. Winter planting was conducted on November 21 of 2002 in the greenhouses at the Horticulture Research Farm at MSU. Three plants of a genotype were planted as a plot in a plastic pot 22 cm in diameter and 23 cm deep. Two of the three plants were inoculated with two aphids each. Each greenhouse bench held 25 plastic pots.

Winter Greenhouse Screening-No-Choice Test

A no-choice test was carried out in the greenhouse from December 2003 to February in 2004, to determine the type of resistance of each resistant source. Each

plot was set up as described for the 2002 greenhouse plantings. Each plot was isolated by the use of a fine nylon net that was held in position over the plastic pot by a foot tomato cage. The entries in the no-choice test were the resistant PIs identified in the 2002 and 2003 screening in the choice test, a resistant check Jackson, a susceptible check Williams 82, and two soybean varieties 'Titan' and 'Loda'.

CONFIRMATION OF RESISTANCE

In the summer of 2004, the six PIs identified as potentially resistant to the aphid after two years of screening and a susceptible check (Williams 82) were evaluated to confirm the resistance. The experiment was set up as a randomized complete block design with three technical replications. Ten plants were planted per 0.6 m plot for each entry. All ten plants were inoculated as described earlier. Ten plants were planted per 0.6 m plot for each entry. All ten plants were inoculated as described earlier.

DATA COLLECTION

In all studies, except the confirmation of resistance test, aphid populations on inoculated trifoliates were counted 10 days after inoculation. Four weeks after inoculation, the accessions were visually rated for susceptibility to soybean aphid using the method of Zhuang (1999). Each plant in a plot was visually rated using the scale shown in Fig. 1. A damage index (DI) for each accession was calculated using the following formula (Zhuang 1999): DI = $\sum$ (Scale value x No. of plants in the category)/ (4 x Total no. of plants evaluated) × 100. The DI can range between 0% for no infestation and 100% for the most severe damage. A DI of 30% or less was classified as resistant, whereas a DI of 30% or more was classified as susceptible. In the second year of field screening the plants

were visually rated weekly for a month beginning at 3 weeks after inoculation and DI value at week 4 after inoculation was used to determine susceptibility of PIs.

Statistical Analysis

The data for each year were analyzed using the PROC GLM procedure in the SAS statistical package V8 (SAS Institute, 1999). Means were separated by least significant difference (LSD) at the 5% probability level. Linear correlations between the average number of aphids per leaflet ten days after inoculation and the DI were calculated with PROC CORR.

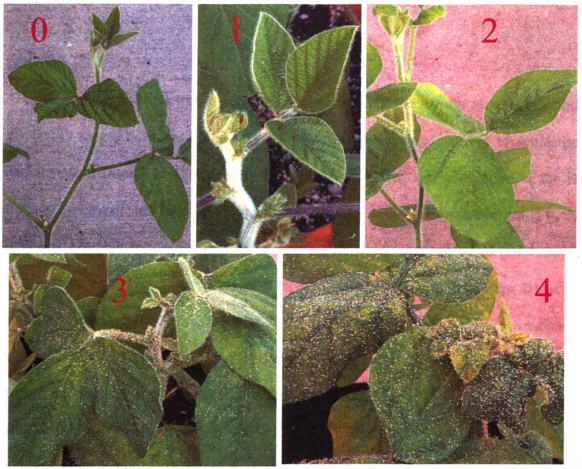

Figure 1: Illustration of the visual rating scale used to establish the Damaging Index (DI). **0** =No aphids, plant appears normal and healthy; **1**=Less than 100 aphids per plant, plant appears normal and healthy; **2**=101 – 300 aphids per plant, mostly on the young leaves and the tender stem at top of plant; **3**=301– 800 aphids per plant, leaves slightly curly and shiny, young leaves and stems covered with aphids; **4**=More than 800 aphids per plant; plants stunted, leaves severely curled, yellow, covered with sooty mold and cast skins.(Images in this thesis /dissertation are presented in color)

RESULTS

CHOICE TEST IN 2002

In the first year of screening in the seed cage the average number of aphids per leaflet ranged from 0 to 500. In the greenhouse the average number of aphids per leaflet ranged from 0 to 170. Results from the visual rating and calculation of the DI (Figure 2) showed that 1008 (99.3%) and 973 (99.1%) of the accessions screened in the field and greenhouse, respectively, were susceptible to the soybean aphid (DI > 30%). The correlation between the average number of aphids per leaflet and the DI of an accession was low ($r = 0.165$, $n=1017$, $p< 0.0001$). Seven of the 1043 accessions appeared to have some resistance (DI<30%) to the aphid in the seed cage, while eight accessions showed some resistance in the greenhouse (Table 1). Only three of these accessions were resistant in both the field and greenhouse screenings. The accessions which did not show resistance in both the field and greenhouse were replanted in the greenhouse in the spring of 2003 and found to be escapes or susceptible. After the first year of screening, PI567543C, PI567597C, and PI567541B (Appendix A, Entries 775, 779, 810) appeared to be resistant to the soybean aphid. PI 567598B (Appendix A, Entry 812) was also selected for further study because it had a DI of 25% in the summer despite a DI of 33.3% in the winter.

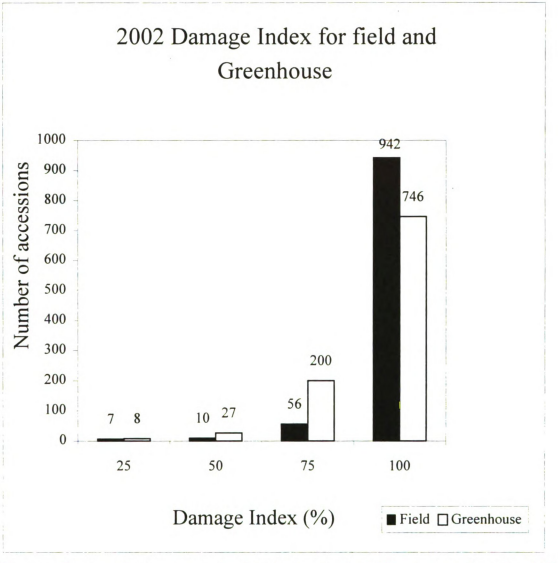

Figure 2:Damage Index categories for choice test in 2002 conducted in the field in summer and in greenhouse in winter at Michigan State University

CHOICE TEST IN 2003

In the second year of screening, the number of aphids per leaflet ranged from 0 to 326 for the first replication and 0 to 244 for the second replication. Based on DI 931 (98.7 %) and 995 (99.0 %) of the plants were found to be susceptible (DI>30%) in replication 1 and 2 respectively (Figure 3). As in the previous year, this DI did not reflect what was obtained by counting the aphid population. The correlation between the average number of aphids per leaflet and the final DI of each accession was again low ($r = 0.20$, $n = 1108$, $p < 0.0001$).

In the first replication, eight accessions performed similar to the three resistant checks. In the second replication, ten accessions performed similar to the three resistant checks (Table 1). The difference in numbers of resistant accessions was due to some accessions failing to germinate in either cage. However there were only two accessions, PI603392 and PI603418C (Appendix B, Entries 1036 and `1049), which had a DI of 25% in both replications. In cases where germination did not occur we replanted in the greenhouse to confirm their resistance, but they were found to be susceptible and were possibly escapes.

Weekly visual rating using the method of Zhuang, (1999) showed that there was a clear difference in susceptibility or resistance among accessions four weeks after inoculation, when aphid densities reached its peak.

NO-CHOICE TEST

The six resistant PIs identified in 2002 and 2003 choice tests, PI 567543C, PI 567597C, PI 567541B, PI 567598B, PI 603392, and PI 603418C, were evaluated for aphid resistance in a no-choice test. The no-choice study revealed that two of the six resistant PIs, PI 567541B and PI 567598B, had significantly lower DIs than the other

entries in the test. The effect these two PIs had on the aphids was similar to that of Jackson, the resistant check (Table 2). There was a high correlation ($r = 0.63$, $p = 0.05$) between the average number of aphids per leaflet 10 days after inoculation and the DI an entry had. The other resistant PIs and Titan had significantly ($p \leq 0.05$) higher damage indices than these two PIs, but were also significantly different from Loda and Williams 82, the susceptible check which had the highest DI.

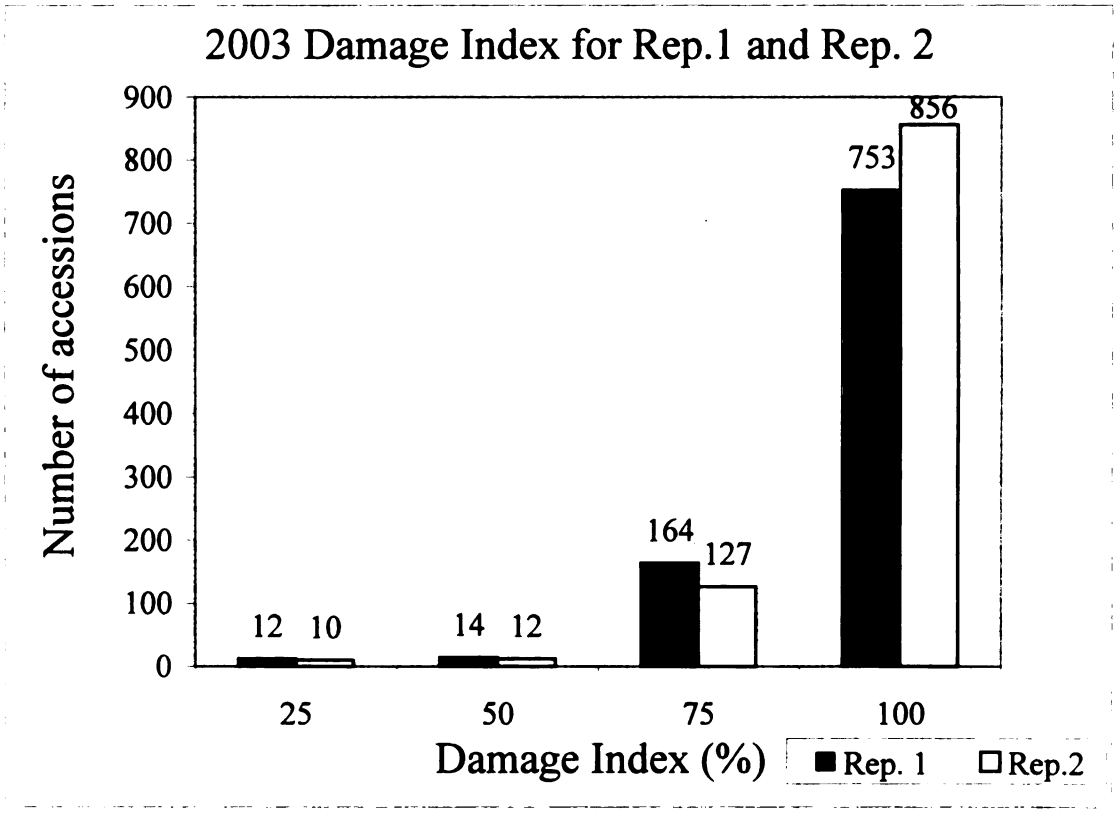

Figure 3: Damage Index categories for choice test in 2003 conducted in summer in two simultaneous replications at Michigan State University

Table 1: Number of accessions in each DI category for 2002 (n = 1043) and 2003 (n= 1108).

Year and Location/replication	Damage Index			
	≤ 30%	31 to50%	51 to75%	> 75%
Field (2002)	7	10	56	942
Greenhouse (2002)	8	27	200	746
Field Rep. 1(2003)	12	14	164	753
Field Rep. 2 (2003)	10	12	127	856

Table 2: Results of the no-choice test for the six resistant accessions, resistant and susceptible checks, and varieties in 2003.

Entry	Maturity group	Average No. of aphids per leaflet †	Damage index (%) ‡
PI567543C	III	8	56b§
PI567597C	III	1	62 b
PI567541B	III	1	25a
PI567598B	III	11	25a
PI603392	III	5	81 c
PI603418C	III	11	77 c
Jackson	VII	2	25a
Titan	I	17	71 c
Loda	II	19	83 d
Williams 82	III	19	100 d
Mean		9.4	60.5

†The data are the averages of 12 leaflets from two replications with two plants per replication and three leaflets per plant taken 10 days after inoculation.

‡Averages of two replications.

§ Means followed by the same letters are not significantly different by the least significant difference test (p=0.05)

CONFIRMATION OF RESISTANCE

Resistance in the four accessions, (PI567543C, PI567597C, PI567541B, and PI 567598B) identified in the choice tests conducted in 2002 was confirmed (Table 3). Three and four weeks after inoculation, respectively, highly significant differences ($p < 0.0001$) were seen between the DIs for these four accessions and the two accessions, PI603392 and PI603418C, obtained from choice tests conducted in 2003. The amount of damage to the plant as a result of aphid feeding was greater on the susceptible check than PI603392 and PI603418C four weeks after inoculation. The susceptible check had curled leaves, appeared stunted, and its leaves were covered with black sooty mold while PI 603392 and PI 603418C showed none of these symptoms.

Table 3: Damage Index (DI) based on three replications in 2004 for six putative resistant accessions, identified after two years of screening, and a susceptible check three and four weeks after inoculation.

Accession or cultivar	Damage Index (%)	
	Three weeks after inoculation	Four weeks after inoculation
PI567543C	25 a†	25 a
PI567597C	26 a	26 a
PI567541B	25 a	25 a
PI567598B	26 a	26 a
PI603392	75 b	79 b
PI603418C	75 b	79 b
'Williams 82'	83 c	100 c
Mean	46.86	51.43

† Mean of three replications of a maximum of 10 plants each. Means followed by the same letters are not significantly different by the least significant difference test (P=0.05)

DISCUSSION

In the USA, research on screening for soybean germplasm resistant to the soybean aphid began as soon as the pest was discovered. Hill et al. (2004) screened 1,542 soybean genotypes, mostly current North American soybean cultivars, and found resistance in three North American soybean ancestral lines: Dowling, Jackson, and PI 71506. These resistant genotypes belong to MG IV to VIII that are not well adapted to the areas of the northern US where soybean aphids are most prevalent. In our study, we identified four resistant accessions (PI 567543C, PI 567597C, PI 567541B, and PI 567598B) belonging to MG III after screening 2,147 soybean accessions in MG 0 to III. All of these primitive Chinese cultivars originated from Shandong province. These resistant accessions can be readily incorporated into the elite soybean germplasm for the north central States.

Lin et al. (1992) showed that the soybean aphid colonizes soybeans at the early vegetative stage. Aphid populations increase gradually until a 10 to 15 day exponential growth phase from late vegetative to early reproductive stage of the plants. It is not surprising that 10 days after inoculation, at the early vegetative stage, a high percentage of our test plants had very few aphids per leaflet. Correlations were low between the number of aphids per leaflet 10 days after inoculation and the DI four week after inoculation in the first and the second years of screening ($r=0.16$ and $r=0.12$, respectively). These low correlation values indicate that counting aphids 10 days after inoculating in the early vegetative stage is not an optimal method for determining the possible resistance or susceptibility of an accession. It would be advisable to count aphids in the late vegetative or early reproductive stage in order to identify truly resistant accessions. However, counting aphids is very tedious and time consuming. For large-

scale evaluation of aphid resistance such as progeny evaluation in a breeding program, the method of Zhuang (1999) is more appropriate.

The six resistant accessions [PI 567543C, PI 567597C, PI 567541B, PI 567598B, PI 603392 and PI 603418C] identified in field and greenhouse choice tests are in MG III. These accessions possess either antixenosis or antibiosis (Smith et al. 1994). The no-choice test showed that PI 567541B and PI 567598B had adverse effects on aphid longevity and fecundity and thus possessed antibiosis according to Painter (1951). The high DIs obtained in no-choice test for PI 567543C, PI 567597C, PI 603392, and PI 603418C which were hitherto resistant in choice tests is likely due to different feeding responses of the aphid between choice and no-choice tests as found by Smith et al. (1994). Also it is possible for a genotype classified as resistant in a choice test to be declared susceptible in a no-choice test (Tingey, 1986). In the no-choice test there was a high ($r = 0.63$, $p= 0.05$) correlation between the average number of aphids per leaflet 10 days after inoculation and the DI an entry had. This high correlation could be attributed to the fact that the entries chosen for this test were truly susceptible or resistant as found in previous screenings.

The test conducted to confirm the resistance found after two years of screening revealed that PI 603392 and PI 603418C, were not resistant to the soybean aphid. Observing the plants after the aphid population had declined due to lower temperatures and reduced photoperiod, PI 603392 and PI 603418C did not show any of the signs associated with severe aphid infestations. According to Painter (1951), the type of resistance that enables a host plant to withstand infestation by insects without suffering severe damage is tolerance. PI 603392 and PI 603418C might be tolerant but

this can only be confirmed with further yield and dry matter studies. These two accessions were not considered resistant after their poor performance in the confirmation test. Smith (1989) also observed that pseudo-resistance or false resistance may occur in normally susceptible plants. Resistance may have been induced temporarily by variations in temperature, day length, soil chemistry, plant or soil water content, or internal plant metabolism. Also susceptible plants may simply escape damage because of incomplete infestation.

This research is the first report of soybean aphid resistance in early maturing soybean germplasm. Further genetic studies are necessary to understand the genetics underlying the resistance that we have found. Genetic studies will expedite the transfer of this resistance into cultivated varieties. These new sources of resistance would be utilized in our breeding program to develop soybean resistant varieties suitable for the North Central States of the USA and would greatly benefit the soybean industry.

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APPENDIX

APPENDIX A

Germplasm used and data collected in 2003

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
1	**PI 548298**	20	10	2	100%	65	53	1	100%
2	**PI 548316**	12	8	2	88%	82	72	2	100%
3	**PI 548317**	-	9	0	-	-	-	0	-
4	**PI 543818**	0	-	0	-	92	25	4	100%
5	**PI 548333**	12	4	0	-	60	47	3	100%
6	**PI 548340**	57	42	2	100%	46	-	1	100%
7	**PI 548348**	41	25	2	88%	18	5	2	75%
8	**PI 548362**	60	53	3	83%	52	35	2	100%
9	**PI 548365**	15	10	2	88%	41	22	3	100%
10	**PI 548366**	18	9	2	88%	40	-	1	100%
11	**PI 548367**	12	9	3	92%	18	-	1	100%
12	**PI 548373**	45	21	2	100%	50	-	1	100%
13	**PI 548376**	0	-	0	-	18	-	1	75%
14	**PI 548377**	0	-	0	-	-	-	0	-
15	**PI 548381**	10	7	1	100%	-	-	0	-
16	**PI 548383**	0	-	0	-	32	-	1	100%
17	**PI 548388**	101	80	1	100%	50	-	1	100%
18	**PI 548403**	153	95	0	-	82	-	1	100%
19	**PI 548412**	60	51	1	100%	101	86	3	100%
20	**PI 548421**	89	66	2	88%	82	-	1	100%
21	**PI 548432**	53	14	3	83%	92	54	3	92%
22	**FC 2108**	107	88	3	83%	72	52	3	100%
23	**FC 2109**	40	25	3	100%	42	31	2	88%
24	**FC 3609**	81	70	2	88%	60	49	5	85%
25	**FC 3654N**	96	67	2	88%	21	13	3	100%
26	**FC 31571**	176	111	1	100%	43	-	1	100%
27	**FC 31572-3**	0	-	0	-	109	88	3	100%
28	**PI 54583**	183	133	3	100%	150	100	5	90%
29	**PI 54591**	93	75	2	88%	115	83	2	100%
30	**PI 54592**	0	-	0	-	80	39	5	90%
31	**PI 54608-2**	51	45	2	88%	56	26	2	100%
32	**PI 54608-3**	0	-	0	-	-	-	0	-
33	**PI 54608-5**	91	78	3	100%	132	88	3	100%
34	**PI 54609**	90	78	3	100%	40	34	3	83%
35	**PI 54610-1**	0	-	0	-	-	-	0	-
36	**PI 54613**	96	67	4	94%	46	33	2	100%
37	**PI 54615**	10	6	1	75%	78	-	1	100%
38	**PI 54615-1**	40	34	2	88%	-	-	0	-
39	**PI 54618**	120	106	4	94%	-	-	0	-
40	**PI 54620**	79	57	2	100%	-	-	0	-
41	**PI 54620-2**	30	22	2	100%	74	-	1	100%
42	**PI 54809**	18	13	1	75%	38	20	2	88%
43	**PI 54834**	26	12	4	94%	75	6	2	100%
44	**PI 54853**	20	10	4	88%	102	38	3	92%
45	**PI 54854**	24	16	4	88%	16	9	3	92%

PI: Pant Intoduction, **MG**: Maturity Group, **MAX**: Maximum Number of Aphids per Leaflet
DI: Damaging Index, **Mean**: Average Number of Aphids on three inoculated leaflets

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
46	**PI 54857**	53	42	4	88%	40	19	3	100%
47	**PI 54865**	20	10	5	95%	49		2	75%
48	**PI 57334**	12	10	4	88%	106		30	92%
49	**PI 61940**	16	11	1	75%	24	14	53	100%
50	**PI 62202**	92	28	5	100%	101	63	4	94%
51	**PI 62483**	57	44	2	88%	41	21	3	92%
52	**PI 63271**	23	19	3	100%	61	41	2	100%
53	**PI 65379**	59	16	3	100%	88	51	2	100%
54	**PI 68423**	53	44	3	100%	65	52	2	100%
55	**PI 68470**	62	56	4	100%	51	40	4	100%
56	**PI 68474-2**	46	20	2	100%	61	30	4	88%
57	**PI 68479**	12	8	1	75%	31	19	4	100%
58	**PI 68479-1**	41	31	2	100%	51	23	3	92%
59	**PI 68483**	18	10	2	75%	41	31	4	94%
60	**PI 68498**	14	12	1	75%	78	37	5	90%
61	**PI68521-1**	12	9	2	63%	42	-	1	100%
62	**PI68523**	20	14	2	88%	40	34	5	100%
63	**PI68528**	10	4	4	94%	33	20	3	92%
64	**PI68530-2**	14	5	4	100%	21	13	4	100%
65	**PI68533-1**	40	9	3	100%	52	23	5	95%
66	**PI68533-2**	40	25	3	83%	101	33	3	92%
67	**PI68535**	30	11	3	100%	60	19	3	92%
68	**PI68551-3**	0	-	0	-	-	-	0	-
69	**PI68554**	40	11	3	100%	20	3	2	88%
70	**PI68560**	85	51	3	100%	32	23	2	100%
71	**PI68576**	84	71	5	90%	81	70	3	100%
72	**PI68586**	12	8	2	75%	65	47	4	100%
73	**PI68599**	14	11	1	75%	111	58	4	94%
74	**PI68604-1**	15	10	4	81%	86	81	5	100%
75	**PI68604-2**	14	8	3	75%	52	32	4	75%
76	**PI68609A**	12	9	5	95%	8	-	1	100%
77	**P168621**	14	8	4	88%	0	0	3	83%
78	**PI68648**	38	28	4	94%	71	-	1	100%
79	**PI68679**	97	10	3	83%	21	-	1	100%
80	**PI68692-2**	44	34	3	100%	15	-	1	100%
81	**PI68701**	120	84	3	100%	81	14	2	88%
82	**PI68710**	69	56	5	90%	8	5	3	100%
83	**PI68731**	33	24	5	90%	9	1	4	100%
84	**PI68732-1**	0	-	0	-	-	-	0	-
85	**PI68746**	0	-	0	-	-	-	0	-
86	**PI68748-1**	104	11	4	94%	9	6	5	75%
87	**PI68756**	61	50	2	100%	94	38	3	92%
88	**PI68759**	52	43	1	75%	6	-	1	75%
89	**PI68761-3**	121	92	4	88%	38	14	3	92%
90	**PI68806**	92	79	2	100%	14	5	3	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
91	**PI69507**	150	121	2	100%	24	18	3	75%
92	**PI69515**	180	128	1	100%	8	5	5	100%
93	**PI69533**	120	92	4	94%	51	10	2	75%
94	**PI69993**	158	11	4	100%	51	20	2	75%
95	**PI69995**	180	112	1	100%	9	6	3	75%
96	**PI70001**	101	43	3	100%	21	3	2	75%
97	**PI70014**	147	108	4	94%	21	13	3	67%
98	**PI70019**	83	73	2	88%	21	13	3	67%
99	**PI70023**	52	39	1	100%	0	0	3	75%
100	**PI70076**	90	72	3	100%	20	2	2	75%
101	**PI70080**	53	44	2	100%	10	8	3	92%
102	**PI70188**	38	23	3	100%	12	7	2	100%
103	**PI70189**	128	111	2	100%	21	13	3	67%
104	**PI70192**	0	-	0	-	8	-	1	100%
105	**PI70199**	151	126	1	100%	59	7	2	100%
106	**PI70201**	120	100	3	92%	66	37	3	92%
107	**PI70202**	217	139	1	100%	94	41	4	100%
108	**PI70212**	61	38	2	88%	1	0	4	94%
109	**PI70213**	20	18	1	100%	35	26	2	100%
110	**PI70247**	90	82	2	100%	68	57	2	100%
111	**PI70253**	81	66	4	100%	20	9	5	70%
112	**PI70462**	20	17	2	88%	61	17	3	92%
113	**PI70466-4**	161	48	2	88%	58	24	3	100%
114	**PI70469**	0	-	0	-	32	20	5	100%
115	**PI70469-1**	30	18	4	100%	26	-	2	88%
116	**PI70470**	128	109	3	100%	-	-	0	-
117	**PI70471**	33	24	4	88%	55	42	5	95%
118	**PI70473**	22	10	4	100%	50	42	4	94%
119	**PI70473-1**	40	25	4	88%	63	-	1	100%
120	**PI70500**	0	-	0	-	-	-	0	-
121	**PI70501**	26	20	4	94%	20	13	2	100%
122	**PI70515**	20	13	4	94%	13	5	3	92%
123	**PI70519**	42	37	3	92%	15	-	1	100%
124	**PI70528**	28	20	1	75%	24	21	5	95%
125	**PI70541**	206	194	3	100%	11	-	1	100%
126	**PI70559**	81	40	3	92%	24	-	1	100%
127	**PI70566**	0	-	3	100%	0	-	1	75%
128	**PI71161**	70	15	4	94%	130	86	5	95%
129	**PI71845**	20	7	2	88%	26	18	2	100%
130	**PI7150-1**	181	66	3	100%	50	27	2	88%
131	**PI79583**	75	33	4	75%	52	18	2	100%
132	**PI79587**	12	10	3	83%	11	4	3	92%
133	**PI79616**	40	32	1	75%	20	15	3	92%
134	**PI79617**	19	13	2	100%	15	-	1	100%
135	**PI79620**	41	34	5	100%	90	-	1	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
136	**PI79627**	48	35	5	75%	41	29	3	100%
137	**PI79628**	111	103	2	75%	23	15	2	100%
138	**PI79645**	6	0	4	75%	6	4	5	100%
139	**PI79648**	0	-	0	-	12	9	4	88%
140	**PI79691**	91	79	3	100%	61	-	1	100%
141	**PI79691-4**	72	57	3	92%	62	30	4	100%
142	**PI79692**	0	-	1	75%	41	16	4	100%
143	**PI79693**	30	15	3	83%	30	12	2	88%
144	**PI79710**	36	20	5	75%	38	22	1	100%
145	**PI79726**	72	64	3	100%	24	14	5	100%
146	**PI79760**	12	9	3	67%	93	48	2	88%
147	**PI79797**	21	18	3	83%	59	38	3	92%
148	**PI79835**	51	43	1	100%	19	11	2	100%
149	**PI79848-1**	61	55	3	92%	40	17	3	92%
150	**PI79870-1**	91	81	5	100%	77	19	4	100%
151	**PI79870-2**	82	66	2	88%	12	-	1	100%
152	**PI79872**	31	24	3	92%	25	17	4	81%
153	**PI79874**	20	14	1	75%	26	-	1	75%
154	**PI79874-1**	30	23	1	75%	-	-	0	-
155	**PI80822**	12	10	4	88%	38	6	4	100%
156	**PI80831**	14	9	5	90%	21	9	3	92%
157	**PI81667**	66	53	3	100%	34	26	1	100%
158	**PI81765**	106	52	5	100%	13	9	3	100%
159	**PI81766**	11	4	3	75%	10	-	1	100%
160	**PI81772**	22	18	5	85%	40	26	3	92%
161	**PI85668**	59	38	3	75%	2	-	1	75%
162	**PI87531**	18	5	5	50%	11	2	3	83%
163	**PI88282**	26	15	4	69%	22	14	2	88%
164	**PI88287**	17	12	3	83%	3	-	1	50%
165	**PI88289**	22	11	4	63%	10	4	3	75%
166	**PI88290**	14	7	3	58%	21	16	3	67%
167	**PI88291**	18	12	3	92%	67	36	4	81%
168	**PI88292**	32	19	5	80%	11	9	4	100%
169	**PI88295**	14	9	1	100%	20	6	3	100%
170	**PI88297**	157	95	3	100%	42	29	2	100%
171	**PI88303-1**	26	-	1	75%	2	0	3	92%
172	**PI88305**	205	89	5	95%	37	21	5	100%
173	**PI88306**	123	41	3	100%	-	-	0	-
174	**PI88306-1**	163	89	3	100%	128	20	3	75%
175	**PI88310**	144	107	3	100%	96	56	3	100%
176	**PI88312**	86	72	3	100%	68	5	5	80%
177	**PI88349**	80	64	2	100%	34	8	2	88%
178	**PI88350**	81	69	4	100%	98	34	4	100%
179	**PI88353**	140	8	2	100%	42	28	3	100%
180	**PI88354**	109	56	3	92%	33	-	0	-

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
181	**PI88359**	207	88	4	100%	-	-	0	-
182	**PI88443**	123	65	5	100%	-	-	0	-
183	**PI88445**	92	69	1	100%	62	50	3	67%
184	**PI88447**	12	9	1	75%	60	23	2	75%
185	**PI88447-3**	80	69	2	100%	120	14	3	83%
186	**PI88448**	201	76	2	100%	29	21	2	75%
187	**PI88466**	40	16	3	67%	18	11	3	58%
188	**PI88484**	130	121	1	75%	0	-	1	25%
189	**PI88486**	201	189	1	100%	6	2	3	67%
190	**PI88490-1**	109	78	3	100%	18	13	2	100%
191	**PI88492**	152	113	2	100%	20	13	3	75%
192	**PI88497**	71	61	3	92%	9	5	4	100%
193	**PI88502**	122	89	4	100%	6	3	2	100%
194	**PI88780**	152	118	4	100%	-	-	0	-
195	**PI88782**	260	132	3	100%	61	14	3	83%
196	**PI88783**	80	69	3	83%	0	0	2	100%
197	**PI88788**	82	60	3	100%	21	14	3	100%
198	**PI88789**	166	96	4	100%	11	6	3	92%
199	**PI88790**	0	-	0	-	-	-	0	-
200	**PI88797**	121	77	2	100%	26	5	3	100%
201	**PI88799**	112	94	1	100%	46	13	5	100%
202	**PI88803-1**	62	58	2	100%	26	12	3	92%
203	**PI88804**	79	50	2	100%	49	26	1	100%
204	**PI88805-2**	61	38	4	100%	45	29	5	90%
205	**PI88806**	72	64	3	100%	53	38	2	63%
206	**PI88818**	91	84	4	100%	34	25	2	50%
207	**PI88998-1**	71	59	2	75%	121	91	3	58%
208	**PI88998-2**	71	61	2	100%	62	27	2	63%
209	**PI89002**	90	31	3	100%	0	0	3	67%
210	**PI89002-2**	42	34	2	88%	27	14	4	88%
211	**PI89003-2**	82	31	4	100%	63	42	3	92%
212	**PI89005-4**	107	84	1	100%	30	10	4	75%
213	**PI89006**	51	18	4	75%	20	2	3	92%
214	**PI89007**	103	98	2	88%	-	-	0	-
215	**PI89009**	60	47	3	92%	12	7	2	100%
216	**PI89009-2**	92	74	3	100%	25	21	5	100%
217	**PI89012-1**	0	-	0	-	-	-	0	-
218	**PI89055**	87	75	4	88%	12	9	2	100%
219	**PI89056-3**	35	24	3	100%	43	31	5	100%
220	**PI89057**	64	49	1	100%	140	56	3	100%
221	**PI89058**	250	65	3	92%	65	34	4	88%
222	**PI89060**	226	191	3	100%	11	2	4	88%
223	**PI89061-1**	30	29	1	100%	31	16	2	88%
224	**PI89061-2**	0	-	0	-	0	-	1	25%
225	**PI89061 N**	99	71	3	100%	21	13	3	92%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
226	**PI89066**	102	88	3	100%	58	10	2	88%
227	**PI89067**	253	213	3	100%	98	77	3	100%
228	**PI89168**	17	4	5	50%	100	69	2	100%
229	**PI89773**	5	2	2	50%	12	6	3	92%
230	**PI89783**	199	40	5	70%	79	64	5	90%
231	**PI89784**	85	67	2	100%	-	-	0	-
232	**PI90407**	0	-	0	-	49	34	3	100%
233	**PI90463**	62	44	3	100%	105	18	5	100%
234	**PI90486**	9	5	3	67%	27	11	4	100%
235	**PI90499-1**	96	72	1	100%	13	-	1	100%
236	**PI90566**	40	34	2	100%	33	17	3	100%
237	**PI90566-1**	41	24	5	85%	31	20	3	100%
238	**PI90567-1**	61	54	4	100%	0	0	5	70%
239	**PI90573**	37	24	5	100%	19	11	5	95%
240	**PI90576-1**	0	-	1	100%	87	21	2	100%
241	**PI90578**	90	75	2	100%	94	83	2	100%
242	**PI90579**	48	36	1	75%	-	-	0	-
243	**PI91089**	116	101	2	100%	277	173	5	80%
244	**PI91100-1**	30	22	1	75%	135	84	2	100%
245	**PI91100-2**	78	5	2	88%	225	-	1	100%
246	**PI91100-3**	98	87	2	100%	57	5	3	100%
247	**PI91108 N**	16	9	2	75%	27	-	0	-
248	**PI91113**	76	54	3	92%	29	16	4	100%
249	**PI91120**	58	22	5	100%	32	18	5	85%
250	**PI91121**	0	-	0	-	155	101	3	100%
251	**PI91127**	20	18	1	75%	77	-	1	100%
252	**PI91142**	92	84	2	100%	106	7	3	92%
253	**PI91149**	150	136	2	100%	117	56	5	100%
254	**PI91151**	78	54	2	100%	169	126	4	88%
255	**PI91152**	98	53	4	100%	126	82	3	100%
256	**PI91153**	0	-	0	-	-	-	0	-
257	**PI91154**	0	-	0	-	0	-	1	75%
258	**PI91159**	0	-	0	-	46	-	1	75%
259	**PI91160**	0	-	0	-	72	59	2	88%
260	**PI91162**	0	-	1	100%	13	10	1	25%
261	**PI91165**	0	-	0	-	96	62	1	100%
262	**PI91169**	0	-	0	-	43	33	5	100%
263	**PI91174**	82	77	1	100%	55	33	3	67%
264	**PI91340**	264	219	4	100%	82	-	1	100%
265	**PI91341**	43	40	1	100%	46	-	1	75%
266	**PI91343**	115	105	3	92%	123	32	3	92%
267	**PI91349**	13	0	3	92%	8	5	2	100%
268	**PI91730**	138	102	2	100%	46	33	2	75%
269	**PI91730-1**	0	-	0	-	-	-	0	-
270	**PI91731**	89	34	2	100%	36	29	3	75%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
271	**PI92466**	0	-	0	-	54	27	4	94%
272	**PI92560**	77	45	4	100%	176	143	2	100%
273	**PI92568**	0	-	0	-	-	-	0	-
274	**PI92577**	0	-	0	-	-	-	0	-
275	**PI92590**	0	-	0	-	63	-	0	-
276	**PI92593**	57	43	4	100%	67	50	3	100%
277	**PI92594**	0	-	0	-	130	-	1	75%
278	**PI92600**	52	4	3	100%	53	34	3	100%
279	**PI92601-1**	28	24	3	92%	12	4	5	85%
280	**PI92601-2**	19	3	2	88%	79	65	3	100%
281	**PI92601-5**	37	30	2	88%	141	90	3	100%
282	**PI92602**	0	-	0	-	-	-	0	-
283	**PI92605**	105	37	4	100%	57	35	3	100%
284	**PI92606**	62	11	3	92%	105	35	3	83%
285	**PI92608**	84	18	3	92%	38	30	5	75%
286	**PI92617**	0	-	0	-	0	-	1	100%
287	**PI92618**	0	-	0	-	0	-	1	100%
288	**PI92619**	0	-	0	-	-	-	0	-
289	**PI92623**	14	12	1	75%	85	63	4	100%
290	**PI92640**	0	-	0	-	5	4	3	100%
291	**PI92641**	6	5	1	75%	43	37	3	100%
292	**PI92642**	0	-	0	-	9	-	1	100%
293	**PI92643**	32	18	2	75%	54	41	3	92%
294	**PI92645**	19	13	2	25%	-	-	0	-
295	**PI92654**	12	11	3	75%	139	50	3	100%
296	**PI92659**	26	24	2	75%	155	119	4	100%
297	**PI92662**	14	8	3	67%	35	-	1	100%
298	**PI92663**	6	5	3	67%	49	6	4	88%
299	**PI92672**	21	3	3	75%	73	26	5	100%
300	**PI92686**	6	1	2	75%	-	-	0	-
301	**PI92688**	91	11	3	92%	52	11	4	81%
302	**PI92690**	58	43	1	100%	2	-	1	100%
303	**PI92691**	40	29	3	67%	17	6	3	100%
304	**PI92702**	67	28	4	100%	19	10	2	100%
305	**PI92704**	67	62	1	100%	12	6	4	100%
306	**PI92707**	38	32	1	75%	18	10	4	100%
307	**PI92718**	0	-	0	-	19	14	2	88%
308	**PI92718-2**	0	-	0	-	16	7	3	83%
309	**PI92720**	141	52	2	100%	32	21	2	100%
310	**PI92722**	142	124	2	100%	20	12	4	100%
311	**PI92728**	0	-	0	-	34	9	5	95%
312	**PI93563**	23	10	1	75%	-	-	0	-
313	**PI93565-A**	65	38	3	100%	7	2	2	100%
314	**PI96193**	0	-	0	-	49	32	3	100%
315	**PI96194-3**	74	35	2	88%	135	62	4	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
316	**PI96199**	25	20	3	67%	25	2	4	75%
317	**PI123578**	0	-	0	-	-	-	0	-
318	**PI171421**	42	36	1	100%	64	21	2	63%
319	**PI189916**	139	35	3	100%	148	109	3	58%
320	**PI200593**	42	20	1	100%	122	68	1	75%
321	**PI200594**	21	15	2	100%	45	27	2	50%
322	**PI248509B**	17	8	3	92%	106	13	2	50%
323	**PI253650A**	43	18	1	100%	30	-	1	100%
324	**PI253650B**	127	98	1	100%	49	-	1	75%
325	**PI253651C**	26	19	5	100%	48	31	2	63%
326	**PI253653A**	0	-	0	-	-	-	0	-
327	**PI253660A**	0	-	0	-	-	-	0	-
328	**PI253660B**	44	38	1	100%	112	68	3	67%
329	**PI253661A**	105	26	2	100%	66	48	2	75%
330	**PI253661B**	115	92	2	88%	123	69	4	69%
331	**PI253665D**	103	98	2	100%	102	17	2	75%
332	**PI266807C**	256	156	3	92%	85	18	2	100%
333	**PI290126A**	0	-	0	-	62	42	4	100%
334	**PI290126B**	175	92	2	100%	69	14	5	90%
335	**PI290134**	0	-	0	-	-	-	0	-
336	**PI291306B**	78	61	3	100%	4	1	2	100%
337	**PI297502**	86	65	1	100%	-	-	0	-
338	**PI297504**	34	22	1	100%	14	11	5	90%
339	**PI297505**	106	86	1	100%	103	81	2	63%
340	**PI297510**	0	-	0	-	-	-	0	-
341	**PI297511**	79	65	4	100%	-	-	0	-
342	**PI297514**	72	67	4	100%	36	8	2	100%
343	**PI297528**	35	9	2	88%	199	172	5	100%
344	**PI297533**	124	78	2	100%	8	1	4	75%
345	**PI297541**	62	27	5	100%	44	36	3	100%
346	**PI297543**	41	26	2	88%	127	84	3	100%
347	**PI297545**	111	82	3	92%	11	-	1	100%
348	**PI297548**	86	2	2	100%	155	98	3	75%
349	**PI303651**	45	29	3	92%	6	5	3	92%
350	**PI319535A**	0	-	0	-	0	-	1	100%
351	**PI319535B**	101	64	3	92%	9	3	4	88%
352	**PI347560**	0	-	0	-	57	-	1	100%
353	**PI347565A**	21	16	2	88%	5	-	1	75%
354	**PI361053**	79	12	3	83%	75	13	5	85%
355	**PI361109**	0	-	0	-	16	2	5	95%
356	**PI361112A**	0	-	0	-	33	4	3	100%
357	**PI361112B**	39	27	1	100%	5	3	3	92%
358	**PI361115**	53	19	3	100%	12	8	4	100%
359	**PI361116**	73	28	2	100%	8	5	3	92%
360	**PI391586**	64	53	2	88%	203	57	3	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
361	**PI393541A**	10	9	2	75%	36	11	3	92%
362	**PI404168**	24	0	3	83%	48	-	1	100%
363	**PI404169A**	17	13	1	75%	116	90	2	100%
364	**PI404169B**	0	0	2	63%	20	14	2	88%
365	**PI404171**	0	-	0	-	71	64	3	92%
366	**PI404175**	12	7	3	67%	67	-	1	100%
367	**PI404180**	16	13	1	75%	139	105	3	92%
368	**PI404182**	0	-	0	-	118	-	1	75%
369	**PI404186**	0	-	0	-	10	-	1	75%
370	**PI404187**	0	-	0	-	-	-	0	-
371	**PI404188A**	22	15	3	92%	10	8	3	100%
372	**PI404188B**	0	-	0	-	30	10	5	90%
373	**PI404189**	0	-	0	-	0	-	1	75%
374	**PI404192A**	65	53	1	75%	21	17	4	63%
375	**PI404192B**	0	-	0	-	6	-	1	75%
376	**PI404192C**	0	-	0	-	-	-	0	-
377	**PI404196A**	30	19	2	88%	47	34	3	100%
378	**PI404196B**	0	-	0	-	-	-	0	-
379	**PI405691**	40	37	3	100%	52	41	2	100%
380	**PI407386D**	56	39	2	100%	5	3	3	100%
381	**PI407653**	25	20	1	100%	27	16	5	100%
382	**PI407654**	23	3	3	83%	7	5	3	92%
383	**PI407655A**	0	0	3	67%	2	1	4	81%
384	**PI407655B**	28	25	2	75%	121	85	3	100%
385	**PI407655C**	25	13	3	83%	94	16	3	92%
386	**PI407656**	44	32	2	75%	10	1	2	88%
387	**PI407657**	0	0	3	58%	0	0	4	88%
388	**PI407659A**	3	1	3	58%	2	1	5	90%
389	**PI407659B**	9	3	3	67%	0	0	3	100%
390	**PI407722**	44	13	2	100%	8	5	5	95%
391	**PI407730**	9	8	1	75%	20	15	2	75%
392	**PI415073A**	49	38	1	100%	33	26	2	88%
393	**PI415074**	0	-	0	-	16	12	4	75%
394	**PI416823**	93	13	3	83%	82	56	2	75%
395	**PI416904A**	19	12	3	83%	16	10	2	75%
396	**PI416904B**	72	22	2	100%	87	50	3	75%
397	**PI416904C**	29	19	3	100%	8	3	2	63%
398	**PI416936**	13	10	1	100%	12	-	1	75%
399	**PI417030**	28	17	2	88%	56	34	5	75%
400	**PI417040A**	39	30	3	100%	92	19	3	92%
401	**PI417040B**	3	1	2	75%	0	-	1	100%
402	**PI417059**	15	9	2	100%	21	7	2	100%
403	**PI417079**	49	39	2	100%	90	51	5	90%
404	**PI417094**	47	22	5	95%	14	4	3	92%
405	**PI417241**	5	0	2	75%	13	4	5	75%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
406	**PI417242**	51	27	2	100%	98	74	5	85%
407	**PI417294**	30	17	5	95%	133	119	2	88%
408	**PI417295**	50	27	3	92%	104	21	4	94%
409	**PI417398**	0	-	0	-	-	-	0	-
410	**PI430619**	0	-	0	-	26	-	1	100%
411	**PI430622**	0	-	0	-	84	60	3	100%
412	**PI430623**	21	21	2	88%	70	-	1	75%
413	**PI430624**	14	6	2	75%	-	-	0	-
414	**PI436562**	0	-	0	-	-	-	0	-
415	**PI436611**	0	-	0	-	13	8	3	100%
416	**PI436684**	13	11	1	100%	15	6	3	92%
417	**PI437486**	21	16	1	100%	67	39	4	100%
418	**PI437487**	32	29	2	88%	3	2	2	88%
419	**PI437488**	69	66	3	100%	11	8	2	100%
420	**PI437554**	32	23	2	100%	9	5	2	88%
421	**PI437556**	53	31	3	100%	51	10	4	94%
422	**PI437558**	28	20	3	92%	32	11	2	100%
423	**PI437559**	15	10	2	88%	71	52	3	100%
424	**PI437563**	0	-	0	-	-	-	0	-
425	**PI437567**	0	-	0	-	25	3	4	100%
426	**PI437571**	51	12	2	88%	8	5	3	100%
427	**PI437573A**	0	-	0	-	149	78	5	100%
428	**PI437573B**	30	25	1	100%	32	14	5	95%
429	**PI437574**	48	35	1	100%	24	3	5	75%
430	**PI437576**	0	-	0	-	-	-	0	-
431	**PI437577**	28	26	1	100%	16	6	5	85%
432	**PI437578**	0	-	0	-	89	57	5	100%
433	**PI437581**	5	4	2	75%	0	0	4	88%
434	**PI437584**	0	-	0	-	23	14	5	100%
435	**PI437585**	11	0	2	88%	5	3	2	100%
436	**PI437586A**	50	3	2	88%	18	12	2	88%
437	**PI437592**	101	92	2	100%	33	21	3	100%
438	**PI437593B**	64	42	2	100%	83	25	2	100%
439	**PI437594A**	14	5	2	63%	10	8	5	95%
440	**PI437594B**	8	4	2	75%	3	1	3	100%
441	**PI437595**	16	6	4	100%	112	26	4	100%
442	**PI437598B**	0	-	0	-	16	1	3	83%
443	**PI437601**	13	8	3	100%	43	14	5	90%
444	**PI437602**	0	-	0	-	-	-	0	-
445	**PI437604**	8	0	3	92%	8	1	2	100%
446	**PI437605A**	14	1	2	88%	39	31	2	100%
447	**PI437605B**	3	2	5	100%	8	6	5	95%
448	**PI437605C**	14	10	5	100%	18	11	2	100%
449	**PI437606**	13	8	4	94%	58	25	3	100%
450	**PI437609B**	28	25	4	94%	90	70	2	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
451	**PI437610B**	14	11	2	100%	58	31	3	100%
452	**PI437614B**	5	3	3	67%	123	96	2	100%
453	**PI437617**	7	6	2	63%	149	88	3	100%
454	**PI437618**	4	1	2	88%	54	17	2	100%
455	**PI437622B**	23	15	2	100%	91	76	2	100%
456	**PI437626**	12	12	4	88%	104	77	3	92%
457	**PI437627**	25	15	4	100%	112	84	3	92%
458	**PI437630D**	45	41	1	100%	8	-	1	100%
459	**PI437631**	43	41	2	100%	58	36	4	100%
460	**PI437635B**	43	8	3	100%	132	113	3	100%
461	**PI437635C**	15	11	1	100%	19	15	3	92%
462	**PI437635D**	37	33	1	100%	102	71	3	100%
463	**PI437635E**	87	76	5	100%	48	33	4	100%
464	**PI437639**	23	9	2	88%	38	21	3	100%
465	**PI437640B**	26	18	1	100%	124	45	3	92%
466	**PI437641A**	2	1	1	75%	30	-	1	100%
467	**PI437641B**	11	6	1	75%	92	62	5	95%
468	**PI437643B**	43	39	1	100%	132	121	2	88%
469	**PI437644**	35	23	1	100%	95	-	1	100%
470	**PI437647**	10	6	3	92%	59	27	3	92%
471	**PI437648B**	77	2	2	100%	82	26	5	90%
472	**PI437649A**	0	0	2	25%	-	-	0	-
473	**PI437649B**	85	84	3	100%	-	-	0	-
474	**PI437651B**	59	10	3	100%	54	-	1	100%
475	**PI437652**	0	-	0	-	72	16	3	92%
476	**PI437653**	0	-	0	-	21	16	3	92%
477	**Williams88**	68	54	3	100%	71	-	1	100%
478	**PI437655**	22	18	3	100%	67	-	0	-
479	**PI437657**	6	0	2	100%	23	7	3	100%
480	**PI437661A**	8	1	5	90%	12	-	1	100%
481	**PI437661B**	24	10	2	100%	96	39	3	92%
482	**PI437666**	48	43	2	88%	27	19	3	92%
483	**PI437669**	64	53	2	100%	86	48	3	100%
484	**PI437673**	0	-	0	-	102	-	1	100%
485	**PI437674**	14	10	2	88%	100	62	3	92%
486	**PI437675**	42	25	3	83%	90	66	2	88%
487	**PI437677**	0	-	0	-	64	52	3	75%
488	**PI437678A**	217	187	2	88%	46	35	3	100%
489	**PI437678B**	61	53	3	100%	138	101	3	83%
490	**PI437682A**	219	130	2	88%	70	-	1	100%
491	**PI437682B**	0	-	0	-	70	-	1	100%
492	**PI437684**	0	-	0	-	-	-	0	-
493	**PI437685A**	91	55	1	100%	36	5	3	92%
494	**PI437685B**	109	11	4	100%	119	103	4	94%
495	**PI437685C**	76	30	4	100%	146	55	3	92%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
496	**PI437685D**	89	69	4	88%	88	17	3	75%
497	**PI437686**	45	29	4	81%	43	23	4	88%
498	**PI437687**	11	2	2	75%	32	19	3	83%
499	**PI437689**	111	76	3	100%	38	5	4	100%
500	**PI437690**	68	55	5	95%	6	0	3	100%
501	**PI437692**	134	84	4	100%	26	18	2	88%
502	**PI437693**	16	10	1	100%	-	-	0	-
503	**PI437695A**	23	15	1	75%	5	-	1	100%
504	**PI437695B**	1	1	0	25%	-	-	-	-
505	**PI437697**	45	32	3	92%	103	-	1	100%
506	**PI437698**	100	88	1	100%	0	-	1	100%
507	**PI437699**	55	27	2	88%	56	34	2	88%
508	**PI437700**	51	42	3	92%	68	47	3	92%
509	**PI437704**	1	0	2	100%	55	45	3	83%
510	**PI437705**	0	-	0	-	-	-	0	-
511	**PI437706**	0	-	0	-	76	-	1	100%
512	**PI437707**	40	36	1	100%	163	133	1	100%
513	**PI437709**	0	0	3	67%	21	15	3	92%
514	**PI437710**	5	0	2	88%	137	111	3	100%
515	**PI437711A**	7	4	1	75%	63	41	1	100%
516	**PI437713**	17	2	4	75%	179	127	2	100%
517	**PI437714**	2	1	1	75%	-	-	0	-
518	**PI437715**	72	52	2	100%	-	-	0	-
519	**PI437716A**	49	2	5	100%	142	105	3	92%
520	**PI437716B**	12	9	3	100%	33	22	4	100%
521	**PI437718**	56	0	3	92%	32	10	3	100%
522	**PI437721B**	103	34	3	100%	112	65	2	100%
523	**PI437721C**	0	-	1	100%	212	39	2	100%
524	**PI437723**	5	0	3	100%	81	52	3	100%
525	**PI437724**	48	45	3	67%	23	20	3	100%
526	**PI437729**	0	-	0	-	-	-	0	-
527	**PI437733**	0	-	0	-	-	-	0	-
528	**PI437737**	1	1	1	75%	-	-	0	-
529	**PI437738A**	25	7	2	88%	25	21	1	100%
530	**PI437739**	0	-	0	-	59	40	1	75%
531	**PI437741**	17	9	4	88%	-	-	0	-
532	**PI437743**	0	0	1	50%	92	42	2	100%
533	**PI437752A**	0	-	0	-	71	41	3	25%
534	**PI437752B**	57	46	4	88%	11	3	5	100%
535	**PI437752C**	56	48	1	100%	71	36	3	92%
536	**PI437753B**	64	55	2	75%	41	33	2	100%
537	**PI437765**	19	13	3	83%	37	27	3	92%
538	**PI437770**	55	5	3	100%	53	33	5	95%
539	**PI437776**	13	10	1	100%	52	48	3	100%
540	**PI437777**	84	64	3	100%	52	35	3	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
541	**PI437787**	110	93	4	100%	0	0	3	92%
542	**PI437788A**	66	37	3	100%	29	3	3	100%
543	**PI437791**	63	51	3	92%	60	17	3	100%
544	**PI437792**	62	58	3	92%	91	12	3	100%
545	**PI437793**	80	58	4	100%	70	47	3	92%
546	**PI437794**	65	38	2	88%	67	43	3	75%
547	**PI437795**	153	80	3	100%	56	38	4	94%
548	**PI437797**	0	-	0	-	141	14	3	100%
549	**PI437802**	0	-	0	-	-	-	0	-
550	**PI437803**	74	64	4	100%	52	42	4	94%
551	**PI437804**	11	8	2	100%	34	28	1	100%
552	**PI437805**	44	33	3	92%	74	33	3	100%
553	**PI437806**	169	103	3	100%	158	31	3	100%
554	**PI437810**	83	71	3	100%	67	12	5	90%
555	**PI437811**	0	-	0	-	99	40	4	100%
556	**PI437834A**	75	63	1	100%	71	33	3	83%
557	**PI437834B**	70	38	1	100%	57	38	3	75%
558	**PI437836**	126	111	4	100%	27	15	3	100%
559	**PI437839A**	0	-	0	-	273	180	3	100%
560	**PI437839B**	114	85	4	100%	56	42	4	94%
561	**PI437840A**	107	73	3	92%	153	64	3	100%
562	**PI437840B**	88	62	3	92%	80	53	2	88%
563	**PI437841**	151	92	2	100%	61	17	4	94%
564	**PI437842**	0	-	0	-	-	-	3	92%
565	**PI437843A**	0	0	1	75%	90	43	0	-
566	**PI437843B**	54	39	4	94%	113	32	2	88%
567	**PI437844A**	75	41	2	100%	-	-	0	-
568	**PI437844B**	34	26	1	100%	60	35	5	95%
569	**PI437845A**	2	1	0	-	74	47	3	83%
570	**PI437845B**	67	52	5	100%	163	115	4	88%
571	**PI437845C**	43	37	1	100%	58	34	5	95%
572	**PI437848A**	23	7	4	88%	23	11	4	100%
573	**PI437848B**	46	2	5	100%	12	5	2	100%
574	**PI437850**	93	66	4	100%	42	25	4	94%
575	**PI437851B**	55	49	1	100%	22	9	3	100%
576	**PI437853B**	83	68	3	100%	121	27	4	100%
577	**PI437856A**	156	89	3	100%	30	21	3	100%
578	**PI437856B**	70	66	2	100%	38	29	5	95%
579	**PI437857C**	45	35	5	100%	190	120	4	88%
580	**PI437860B**	139	138	3	100%	-	-	1	100%
581	**PI437863A**	45	33	4	100%	-	-	1	75%
582	**PI437863B**	117	61	2	100%	47	34	2	75%
583	**PI437864B**	127	111	4	100%	42	38	3	75%
584	**PI437865**	0	-	4	100%	24	12	3	92%
585	**PI437867A**	34	29	0	-	46	38	5	95%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
586	**PI437867B**	80	41	1	100%	104	72	3	92%
587	**PI437870**	0	-	0	-	-	-	0	-
588	**PI437871**	33	26	1	100%	74	54	4	88%
589	**PI437873**	74	68	1	100%	100	-	3	83%
590	**PI437874**	69	4	2	100%	-	-	3	92%
591	**PI437875**	89	78	2	100%	-	-	0	-
592	**PI437876**	88	32	3	100%	-	-	0	-
593	**PI437877B**	0	-	4	100%	15	10	4	94%
594	**PI437877C**	168	124	0	-	7	5	5	95%
595	**PI437878B**	0	-	2	100%	20	5	3	92%
596	**PI437879**	0	-	0	-	-	-	0	-
597	**PI437880**	113	81	0	-	74	59	4	100%
598	**PI437881**	168	142	3	100%	70	12	3	92%
599	**PI437882A**	137	66	2	100%	7	-	1	75%
600	**PI437882B**	0	-	2	100%	-	-	0	-
601	**PI437883**	103	30	2	100%	17	2	2	100%
602	**PI437884**	25	18	1	100%	-	-	1	100%
603	**PI437885**	62	45	2	100%	-	-	0	-
604	**PI437886B**	118	22	1	75%	205	134	2	75%
605	**PI437887B**	104	86	1	100%	127	76	2	100%
606	**PI437887C**	125	92	1	100%	198	147	5	95%
607	**PI437888B**	0	-	0	-	-	-	0	-
608	**PI437889**	103	70	1	75%	12	5	3	100%
609	**PI437890B**	12	6	4	94%	28	12	4	94%
610	**PI437891**	89	71	1	100%	3	1	5	100%
611	**PI437893**	34	28	4	100%	9	4	3	92%
612	**PI437894**	38	14	3	100%	9	4	3	83%
613	**PI437896**	7	5	2	75%	6	3	5	95%
614	**PI437897**	102	32	3	100%	12	8	4	94%
615	**PI437898**	150	122	3	100%	11	6	4	94%
616	**PI437899**	103	89	3	100%	9	6	5	95%
617	**PI437900**	0	-	0	-	10	-	1	100%
618	**PI437902A**	98	78	4	100%	14	5	3	100%
619	**PI437902B**	104	87	2	88%	42	28	3	100%
620	**PI437902C**	76	63	2	100%	31	3	3	100%
621	**PI437902D**	21	12	1	75%	6	4	3	92%
622	**PI437903**	103	82	4	94%	36	25	4	94%
623	**PI437904**	33	26	2	100%	93	56	0	-
624	**PI437907**	41	9	3	100%	5	3	0	-
625	**PI437908**	34	34	1	100%	62	48	5	90%
626	**PI437909A**	45	9	4	100%	30	22	5	90%
627	**PI437909B**	21	20	3	100%	113	79	3	92%
628	**PI437910C**	22	18	5	100%	122	108	3	92%
629	**PI437911**	10	8	1	100%	42	-	1	100%
630	**PI437912**	48	39	1	100%	77	61	5	90%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
631	**PI437914**	17	12	2	100%	91	60	5	95%
632	**PI437918**	31	21	2	100%	65	53	4	88%
633	**PI437919**	33	30	1	100%	88	73	4	94%
634	**PI437920C**	12	11	4	88%	0	0	3	92%
635	**PI437921**	0	-	0	-	-	-	0	-
636	**PI437922**	52	17	2	100%	82	59	4	94%
637	**PI437926**	9	7	2	88%	111	20	3	100%
638	**PI437931**	28	24	3	100%	47	32	4	94%
639	**PI437932**	24	17	1	100%	74	11	4	88%
640	**PI437935**	37	30	5	95%	101	81	4	100%
641	**PI437940**	46	23	3	100%	42	30	5	95%
642	**PI437943**	32	28	4	100%	53	45	3	100%
643	**PI437946A**	5	2	3	83%	46	40	5	95%
644	**PI437946B**	0	-	0	-	32	20	3	92%
645	**PI437950**	6	2	4	88%	12	9	2	88%
646	**PI437954**	59	39	0	-	23	13	5	100%
647	**PI437956B**	19	4	2	100%	115	88	5	100%
648	**PI437957B**	0	-	0	-	82	72	4	94%
649	**PI437961**	80	22	2	100%	64	38	4	94%
650	**PI437964A**	38	4	3	100%	72	54	4	100%
651	**PI437964B**	17	14	2	100%	115	42	3	67%
652	**PI437970**	5	3	1	100%	92	39	2	63%
653	**PI437973**	263	243	2	100%	26	21	2	88%
654	**PI437974B**	151	50	3	100%	33	3	2	100%
655	**PI437985A**	126	121	2	100%	31	18	4	88%
656	**PI437985B**	37	34	2	100%	9	5	4	100%
657	**PI438001**	32	29	3	92%	74	55	5	95%
658	**PI438003**	45	40	1	100%	57	47	4	100%
659	**PI438011**	28	18	1	100%	47	25	3	100%
660	**PI438019B**	32	10	4	100%	43	32	4	100%
661	**PI438046**	31	14	3	100%	-	-	0	-
662	**PI438047**	27	0	3	92%	111	31	5	100%
663	**PI438051B**	109	103	3	100%	121	81	5	95%
664	**PI438057**	17	3	4	100%	181	55	4	88%
665	**PI438061**	110	105	3	100%	90	27	4	94%
666	**PI438066**	10	1	3	92%	8	1	5	95%
667	**PI438069A**	92	39	3	100%	78	61	5	100%
668	**PI438069B**	2	1	1	75%	13	10	5	90%
669	**PI438069C**	112	104	2	88%	30	12	3	92%
670	**PI438070**	0	-	0	-	20	13	2	100%
671	**PI438075**	76	72	3	92%	111	36	2	75%
672	**PI438076**	29	23	1	75%	12	7	3	100%
673	**PI438079**	16	6	2	88%	85	41	3	100%
674	**PI438080**	36	12	2	100%	5	1	5	95%
675	**PI438083**	65	54	1	100%	52	27	5	95%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
676	**PI438084**	186	111	3	92%	48	39	3	100%
677	**PI438085**	70	30	3	92%	105	13	3	100%
678	**PI438086**	111	74	2	100%	119	68	2	100%
679	**PI438098**	0	-	0	-	-	-	0	-
680	**PI438098**	49	36	3	100%	155	83	2	100%
681	**PI438101**	8	0	2	88%	247	156	5	90%
682	**PI438102**	95	88	3	92%	378	134	5	95%
683	**PI438103**	57	54	3	92%	277	145	5	95%
684	**PI438104**	42	30	3	100%	198	114	5	95%
685	**PI438105B**	41	38	4	100%	18	11	3	83%
686	**PI438109C**	101	21	3	92%	86	13	5	95%
687	**PI438112B**	40	2	2	88%	0	0	4	94%
688	**PI438114**	39	18	3	75%	226	187	5	100%
689	**PI438124B**	6	4	1	100%	506	232	4	94%
690	**PI438129**	27	23	3	83%	43	32	5	90%
691	**PI438130**	71	65	1	100%	173	19	5	100%
692	**PI438131**	0	-	0	-	-	-	0	-
693	**PI438132**	6	4	4	75%	83	42	4	100%
694	**PI438133A**	10	7	2	75%	-	-	0	-
695	**PI438133B**	0	0	1	75%	49	21	4	88%
696	**PI438139**	18	4	3	92%	130	68	4	81%
697	**PI438144**	37	3	3	75%	19	10	2	75%
698	**PI438153**	53	46	4	88%	18	9	3	100%
699	**PI438163**	29	22	3	83%	68	6	5	95%
700	**PI438164B**	82	32	4	100%	110	56	4	100%
701	**PI438167**	27	15	3	100%	151	94	5	100%
702	**PI438168**	33	21	2	88%	77	17	3	100%
703	**PI438173**	16	12	2	100%	32	8	2	100%
704	**PI438175**	51	25	3	92%	77	20	4	100%
705	**PI438176**	0	-	0	-	57	36	5	100%
706	**PI438177**	22	6	3	83%	93	80	3	92%
707	**PI438178**	44	28	1	100%	149	108	3	92%
708	**PI438183**	7	3	2	88%	69	45	3	100%
709	**PI438185**	0	0	3	92%	22	11	5	85%
710	**PI438186**	15	6	3	83%	2	1	4	100%
711	**PI438192**	15	13	3	100%	160	93	5	100%
712	**PI438194**	14	13	1	100%	116	93	3	100%
713	**PI438197**	22	14	1	100%	310	148	2	88%
714	**PI438198**	44	31	3	92%	184	41	4	94%
715	**PI438199**	0	-	0	-	106	11	4	75%
716	**PI438212C**	61	57	1	100%	163	135	5	95%
717	**PI438214**	39	5	2	100%	24	9	2	100%
718	**PI438216**	0	-	0	-	37	27	5	100%
719	**PI438219**	0	-	0	-	55	-	1	100%
720	**PI438222**	17	14	3	92%	60	43	3	92%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
721	**PI438223**	103	18	4	100%	145	40	3	100%
722	**PI438226**	36	31	3	100%	176	116	3	92%
723	**PI438227**	96	31	2	100%	280	192	3	100%
724	**PI438228**	44	27	2	100%	295	44	4	94%
725	**PI438229**	0	-	0	-	-	-	0	-
726	**PI438234B**	58	46	3	100%	179	117	4	94%
727	**PI438235**	55	41	4	100%	374	285	4	94%
728	**PI438236**	21	17	2	88%	84	25	2	88%
729	**PI438237**	0	-	3	100%	47	33	4	94%
730	**PI438242**	0	-	0	-	15	-	1	100%
731	**PI438244**	176	94	0	-	83	69	4	100%
732	**PI438249A**	166	85	3	75%	107	90	4	94%
733	**PI438249B**	0	0	2	100%	10	4	4	88%
734	**PI438250B**	3	2	3	92%	91	30	3	100%
735	**PI438251**	17	12	5	100%	130	116	5	90%
736	**PI438252B**	11	8	1	100%	146	126	3	83%
737	**PI438252C**	48	45	2	100%	8	6	3	100%
738	**PI438254D**	41	32	3	92%	35	24	5	95%
739	**PI438256B**	24	21	1	100%	16	10	3	100%
740	**PI438257A**	56	35	3	100%	-	-	0	-
741	**PI438257B**	141	135	3	100%	43	23	3	100%
742	**PI438258**	72	52	2	88%	17	-	1	100%
743	**PI438259B**	80	68	3	100%	99	-	1	100%
744	**PI438261**	91	61	3	100%	151	96	4	100%
745	**PI438262**	52	40	3	100%	101	-	1	75%
746	**PI438263**	31	21	2	100%	57	47	3	100%
747	**PI438266A**	27	20	3	75%	-	-	0	-
748	**PI438266B**	50	40	2	88%	72	-	1	100%
749	**PI438270**	72	62	3	100%	33	19	4	100%
750	**PI438271B**	101	97	3	92%	7	4	2	100%
751	**PI442004**	19	15	1	100%	-	-	0	-
752	**PI458510**	129	29	3	100%	85	-	1	100%
753	**PI458519B**	79	73	3	100%	55	21	3	100%
754	**PI458521**	78	27	3	100%	24	15	4	100%
755	**PI458825B**	0	-	0	-	-	-	0	-
756	**PI458826B**	67	33	4	100%	55	33	5	90%
757	**PI458828**	11	1	3	83%	12	8	5	100%
758	**PI464877**	17	15	3	75%	41	31	5	95%
759	**PI464879**	61	42	3	100%	80	45	4	100%
760	**PI464902**	26	22	1	100%	36	-	1	75%
761	**PI464910**	41	11	4	94%	116	-	1	100%
762	**PI464914B**	64	24	3	100%	8	2	5	100%
763	**PI464916**	90	45	2	88%	61	16	3	92%
764	**PI464920A**	0	-	0	-	-	-	0	-
765	**PI464920B**	80	56	3	92%	6	4	4	94%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
766	**PI464923**	0	-	0	-	28	15	3	100%
767	**PI464924**	70	46	2	88%	73	34	4	94%
768	**PI467326**	30	24	1	75%	27	11	5	90%
769	**PI468384**	0	-	0	-	-	-	0	-
770	**PI468385**	71	43	3	83%	37	-	1	100%
771	**PI468914**	83	35	4	88%	89	-	1	75%
772	**PI468919**	3	2	0	-	-	-	0	-
773	**PI470227B**	62	55	4	100%	56	29	4	100%
774	**PI475810**	121	110	1	100%	57	26	3	92%
775	**PI475811A**	33	28	4	94%	9	4	3	100%
776	**PI475811B**	40	16	3	100%	27	20	3	100%
777	**PI475812A**	20	12	4	100%	96	76	2	100%
778	**PI475812B**	91	68	3	100%	12	5	5	100%
779	**PI475813A**	6	3	5	95%	112	-	1	100%
780	**PI475813B**	30	6	4	88%	36	26	4	100%
781	**PI475814**	45	32	3	92%	19	13	2	100%
782	**PI475815**	9	8	3	75%	64	44	4	100%
783	**PI475817**	4	2	2	75%	160	133	4	100%
784	**PI475818**	8	3	3	58%	74	53	2	100%
785	**PI475819**	91	33	3	92%	107	28	2	100%
786	**PI475820**	99	92	2	100%	281	79	3	100%
787	**PI475822A**	10	2	1	75%	107	66	2	100%
788	**PI475822B**	34	0	3	83%	42	32	3	100%
789	**PI475822C**	9	7	4	75%	13	10	2	100%
790	**PI475823**	5	0	3	67%	256	169	2	100%
791	**PI475824A**	58	44	3	58%	117	92	3	100%
792	**PI475824B**	9	4	3	58%	189	49	4	100%
793	**PI475826**	39	31	3	75%	143	101	3	92%
794	**PI475828**	0	-	3	67%	281	137	2	100%
795	**PI475829B**	13	10	0	-	9	-	1	100%
796	**PI475830**	112	84	2	50%	59	44	5	75%
797	**PI475831**	14	7	3	92%	46	16	3	100%
798	**PI479720**	15	10	4	100%	52	31	2	100%
799	**PI479722**	14	10	2	63%	38	21	2	100%
800	**PI479729**	17	14	3	92%	42	35	2	100%
801	**PI479730**	0	-	0	-	64	49	2	88%
802	**PI479735**	19	15	2	50%	36	25	4	75%
803	**PI479740**	25	5	2	63%	46	32	5	95%
804	**PI479741**	6	2	4	88%	23	5	5	100%
805	**PI490765**	96	15	2	100%	7	2	2	100%
806	**PI490766**	128	115	3	92%	112	41	2	88%
807	**PI490767**	96	73	2	100%	13	2	3	83%
808	**PI490768**	0	-	2	75%	21	8	2	88%
809	**PI490769**	12	10	3	100%	11	8	2	88%
810	**PI495017A**	7	4	1	100%	-	-	0	-

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
811	**PI503334**	89	22	1	75%	-	-	0	-
812	**PI507543**	0	0	2	100%	-	-	0	-
813	**PI518715**	30	8	1	75%	25	-	1	100%
814	**PI518716**	10	5	1	75%	36	-	1	100%
815	**PI532442**	3	1	2	100%	133	41	3	100%
816	**PI532448**	58	9	3	100%	13	10	3	92%
817	**PI532462A**	119	104	2	88%	99	21	3	100%
818	**PI532463A**	107	62	2	100%	102	54	3	100%
819	**PI532463B**	167	147	5	100%	20	3	2	88%
820	**PI538375**	17	2	2	100%	2	-	1	75%
821	**PI538376**	149	105	3	100%	40	-	1	75%
822	**PI538377**	56	45	4	100%	22	14	3	100%
823	**PI538380**	99	61	3	100%	63	29	2	88%
824	**PI538381**	161	109	5	95%	34	22	2	88%
825	**PI538382**	5	3	2	75%	45	5	5	90%
826	**PI538386A**	59	42	2	100%	45	26	3	100%
827	**PI538397**	76	24	2	100%	169	67	3	100%
828	**PI538398**	41	25	2	100%	87	62	5	95%
829	**PI540739**	5	4	1	100%	37	28	4	100%
830	**PI549021A**	31	4	4	100%	52	41	3	92%
831	**PI549029**	9	5	4	100%	103	94	0	-
832	**PI549030A**	5	4	0	-	23	-	1	100%
833	**PI549031**	65	40	2	100%	101	78	3	100%
834	**PI549041A**	0	0	1	100%	21	11	5	95%
835	**PI556948**	27	14	3	100%	50	36	4	94%
836	**PI561227**	0	-	0	-	186	-	1	75%
837	**PI561228**	0	-	0	-	77	-	1	75%
838	**PI561229**	0	-	0	-	-	-	0	-
839	**PI561231**	0	-	0	-	34	-	1	100%
840	**PI561232**	0	-	1	100%	25	8	5	95%
841	**PI561233A**	41	31	0	-	59	34	3	92%
842	**PI561234**	0	-	0	-	9	-	1	100%
843	**PI561235**	0	-	0	-	-	-	0	-
844	**PI561236**	0	-	0	-	12	-	1	75%
845	**PI561238**	37	34	1	100%	55	21	4	88%
846	**PI561241**	0	0	1	100%	16	5	5	95%
847	**PI561295**	73	67	1	100%	-	-	0	-
848	**P1561296C**	31	20	1	100%	5	-	1	75%
849	**PI561297**	48	25	2	100%	11	-	1	100%
850	**PI561298**	37	31	1	100%	7	5	2	88%
851	**PI561299B**	27	21	1	100%	-	-	0	-
852	**PI561300A**	41	15	3	100%	17	13	3	100%
853	**PI561300B**	0	-	3	100%	9	7	3	100%
854	**PI561301**	64	52	1	100%	-	-	0	-
855	**PI561302C**	27	20	1	75%	1	-	1	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
856	**PI561302D**	0	-	0	-	32	20	3	92%
857	**PI561304A**	0	-	0	-	12	7	3	100%
858	**PI561304B**	113	98	4	100%	-	-	0	-
859	**PI561308**	69	48	3	100%	11	5	1	75%
860	**PI561309A**	47	36	2	88%	4	-	1	75%
861	**PI561309B**	114	2	2	100%	93	-	1	75%
862	**PI561310**	102	8	5	100%	61	-	1	75%
863	**PI561311A**	59	37	3	92%	152	43	4	100%
864	**PI561311B**	74	30	2	88%	-	-	0	-
865	**PI561312**	24	10	4	88%	137	104	3	83%
866	**PI561314A**	0	-	0	-	14	11	3	100%
867	**PI561314B**	0	-	0	-	52	40	3	100%
868	**PI561315**	63	33	3	92%	81	65	3	100%
869	**PI561316**	3	2	1	100%	1	-	1	100%
870	**PI561317**	0	-	0	-	132	83	5	90%
871	**PI561318A**	107	94	3	100%	42	23	2	75%
872	**PI561318B**	101	91	2	100%	20	16	2	75%
873	**PI561319A**	0	-	0	-	84	40	4	81%
874	**PI561319B**	0	-	0	-	36	-	3	75%
875	**PI561320**	0	-	1	75%	65	31	5	95%
876	**PI561321**	37	21	3	92%	13	3	4	88%
877	**PI561322**	73	14	2	100%	105	36	4	94%
878	**PI561323**	7	2	1	100%	113	29	3	83%
879	**PI561324**	0	-	0	-	7	-	3	100%
880	**PI561328**	14	6	4	94%	44	18	3	100%
881	**PI561329**	0	-	0	-	-	-	0	-
882	**PI561330A**	76	43	2	100%	125	-	1	100%
883	**PI561330B**	0	-	0	-	36	12	5	90%
884	**PI561331**	34	31	3	83%	115	87	4	88%
885	**PI561333**	0	-	0	-	44	26	4	94%
886	**PI561335**	92	85	2	100%	101	84	2	100%
887	**PI561336**	0	-	0	-	180	49	2	88%
888	**PI561337**	103	22	1	100%	95	74	4	88%
889	**PI561338A**	29	18	3	100%	105	87	2	100%
890	**PI561338B**	34	15	2	100%	73	55	2	100%
891	**PI561339**	7	3	1	100%	27	-	1	100%
892	**PI561340**	15	10	3	92%	115	45	4	94%
893	**PI561341A**	0	-	0	-	83	24	4	100%
894	**PI561341B**	0	-	0	-	17	9	2	100%
895	**PI561345**	67	55	1	100%	280	189	3	100%
896	**PI561346**	65	54	3	100%	152	-	1	100%
897	**PI561347**	114	39	1	100%	126	19	2	88%
898	**PI561348**	0	-	0	-	52	-	1	100%
899	**PI561349**	44	17	2	100%	71	60	3	100%
900	**PI561350A**	27	22	2	100%	26	13	3	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
901	**PI561350B**	0	-	0	-	28	16	3	100%
902	**PI567174C**	0	-	0	-	115	89	3	100%
903	**PI567284**	0	-	0	-	57	43	5	95%
904	**PI567288B**	81	67	1	100%	143	-	1	100%
905	**PI567296A**	13	9	3	92%	96	-	1	75%
906	**PI567302**	39	31	3	100%	174	116	3	100%
907	**PI567351B**	107	10	2	75%	-	-	2	88%
908	**PI567482A**	109	0	2	88%	45	17	5	100%
909	**PI567482B**	0	-	0	-	77	73	2	100%
910	**PI567482C**	0	-	0	-	73	-	1	100%
911	**PI567484**	16	0	3	92%	67	40	2	88%
912	**PI567487**	23	21	1	100%	155	85	2	88%
913	**PI567489A**	45	24	5	90%	6	-	1	100%
914	**PI567489B**	21	18	2	63%	65	43	4	100%
915	**PI548445**	157	132	2	25%	27	17	3	25%
916	**PI567493**	57	50	3	58%	13	-	4	88%
917	**PI567494**	38	32	2	63%	47	27	4	100%
918	**PI567496**	20	2	3	67%	17	12	4	88%
919	**PI567497**	34	18	4	88%	6	-	1	100%
920	**PI567498**	45	26	3	92%	117	24	4	94%
921	**PI567499**	40	23	4	75%	7	4	4	94%
922	**PI567500**	16	9	1	75%	7	4	3	92%
923	**PI567502**	0	-	0	-	5	4	5	95%
924	**PI567506**	110	92	2	100%	119	103	3	100%
925	**PI567507C**	111	50	1	100%	2	0	3	92%
926	**PI567508A**	109	51	4	69%	-	-	0	-
927	**PI567510A**	76	16	2	100%	11	-	1	100%
928	**PI567510B**	77	47	1	100%	-	-	0	-
929	**PI567511**	14	7	1	100%	10	5	3	100%
930	**PI567512C**	78	62	4	88%	7	5	4	75%
931	**PI567513**	63	33	4	88%	11	5	3	83%
932	**PI574480B**	10	3	1	75%	117	48	3	75%
933	**PI578360**	22	14	4	100%	272	112	2	100%
934	**PI578362**	15	0	3	92%	10	6	5	100%
935	**PI578363**	160	139	2	88%	113	65	5	75%
936	**PI578364**	28	14	1	100%	86	71	5	80%
937	**PI578365**	310	162	1	100%	67	33	4	81%
938	**PI578366**	17	9	3	92%	42	35	5	100%
939	**PI578367**	0	-	0	-	91	68	3	100%
940	**PI578368**	42	27	1	100%	170	-	1	100%
941	**PI578369**	83	71	3	100%	54	-	1	75%
942	**PI578370**	0	-	0	-	0	0	3	83%
943	**PI578374**	49	-	4	100%	0	-	1	75%
944	**PI578375B**	31	-	3	100%	59	44	3	100%
945	**PI578376**	95	-	3	100%	102	63	3	83%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
946	**PI578378**	42	-	3	100%	21	9	3	83%
947	**PI578380A**	0	-	0	-	186	134	2	100%
948	**PI578380B**	0	-	1	100%	57	30	3	92%
949	**PI578382**	10	-	2	100%	38	22	5	100%
950	**PI578384**	15	-	2	100%	21	15	4	94%
951	**PI578385**	0	-	1	100%	21	13	3	92%
952	**PI578388B**	0	-	0	-	39	30	2	100%
953	**PI578390**	44	-	2	100%	31	21	5	95%
954	**PI578392A**	17	-	3	100%	-	-	0	-
955	**PI578392B**	7	-	3	100%	101	-	1	100%
956	**PI578399**	0	-	0	-	3	1	3	100%
957	**PI578400**	52	46	1	100%	139	68	5	100%
958	**PI578401A**	5	3	1	100%	91	21	3	75%
959	**PI578401B**	27	17	1	100%	12	-	1	75%
960	**PI578401C**	6	4	1	100%	93	-	1	75%
961	**PI578401D**	15	0	2	100%	83	17	5	50%
962	**PI578402**	0	-	1	100%	29	-	1	100%
963	**PI578403**	0	-	1	75%	35	-	1	75%
964	**PI578405**	0	-	1	100%	119	-	2	63%
965	**PI578406**	0	-	1	75%	-	-	1	75%
966	**PI578407**	0	-	1	75%	89	-	1	100%
967	**PI578408**	0	-	0	-	13	2	5	80%
968	**PI578409A**	33	-	2	88%	6	-	1	100%
969	**PI578409B**	0	-	1	100%	77	67	3	100%
970	**PI578410**	0	-	1	100%	7	-	1	75%
971	**PI578411**	0	-	0	-	33	21	5	95%
972	**PI578412**	10	-	3	58%	6	4	3	100%
973	**PI578413**	0	-	0	-	-	-	0	-
974	**PI578414**	0	-	1	75%	116	24	3	100%
975	**PI578416**	0	-	0	-	-	-	0	-
976	**PI578417B**	28	-	2	100%	93	80	2	100%
977	**PI578418**	44	-	2	75%	77	-	1	100%
978	**PI578419A**	27	-	4	69%	80	-	1	100%
979	**PI578419B**	29	-	3	75%	85	-	1	100%
980	**PI578420**	0	-	0	-	5	3	4	100%
981	**PI578421**	34	-	2	100%	35	12	5	100%
982	**PI578425**	45	-	1	100%	18	2	4	100%
983	**PI578431**	38	-	3	92%	38	32	3	92%
984	**PI578432B**	0	-	0	-	0	-	1	100%
985	**PI578473A**	6	-	3	100%	81	32	3	100%
986	**PI578481**	12	-	2	88%	21	15	3	92%
987	**PI578497A**	19	-	3	100%	33	15	3	92%
988	**PI578497B**	18	-	5	85%	39	20	3	100%
989	**PI578499A**	5	-	3	100%	107	83	3	100%
990	**PI578499B**	10	-	3	100%	109	89	2	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
991	**PI578499C**	65	-	4	100%	162	57	3	92%
992	**PI592899**	0	-	0	-	110	10	4	100%
993	**PI592901**	54	-	3	83%	80	8	4	100%
994	**PI592927**	44	-	5	75%	72	25	3	100%
995	**PI592928**	56	-	1	100%	191	106	3	83%
996	**PI592945**	36	-	3	100%	134	60	3	100%
997	**PI592956A**	30	-	3	100%	62	4	4	100%
998	**PI592956B**	22	-	4	100%	371	47	3	92%
999	**PI592956C**	1	-	3	100%	110	14	2	100%
1000	**PI592971**	26	-	3	100%	87	80	3	75%
1001	**PI592974**	33	-	3	100%	126	26	3	100%
1002	**PI592978**	6	-	3	92%	51	37	5	70%
1003	**PI592980**	41	-	3	100%	112	16	5	90%
1004	**PI592981**	31	-	3	100%	38	33	5	100%
1005	**PI593949A**	17	-	4	100%	41	24	3	92%
1006	**PI593949B**	20	-	4	100%	101	70	2	100%
1007	**PI593956A**	24	-	4	88%	165	33	3	75%
1008	**PI593956B**	0	-	0	-	58	10	3	100%
1009	**PI593956C**	11	-	5	95%	25	16	4	100%
1010	**PI593956D**	16	-	1	100%	60	49	3	75%
1011	**PI593956E**	37	-	2	100%	125	89	3	92%
1012	**PI593957**	35	-	3	100%	33	17	4	94%
1013	**PI593961**	67	-	2	100%	4	1	3	75%
1014	**PI593962**	0	-	0	-	53	46	2	100%
1015	**PI593963**	42	31	4	100%	33	27	3	100%
1016	**PI593964**	36	32	2	88%	40	28	2	88%
1017	**PI593966**	61	2	3	83%	11	9	2	100%
1018	**PI593967**	12	6	2	100%	38	6	5	100%
1019	**PI593968**	53	30	4	100%	150	91	2	100%
1020	**PI593969**	0	-	0	-	-	-	0	-
1021	**PI594899A**	89	5	4	100%	175	116	4	100%
1022	**PI594899B**	68	53	2	100%	115	81	3	100%
1023	**PI594900A**	71	57	3	100%	8	1	5	95%
1024	**PI594902**	98	63	4	100%	110	24	3	75%
1025	**PI594909**	36	14	4	75%	39	23	3	100%
1026	**PI602491**	101	79	4	81%	61	50	3	92%
1027	**PI602492**	33	4	2	63%	73	12	3	100%
1028	**PI602497A**	80	40	2	50%	10	7	2	100%
1029	**PI602498**	65	14	1	75%	214	142	4	100%
1030	**PI602499**	98	12	2	25%	-	-	0	-
1031	**PI602502A**	36	25	2	50%	30	-	1	75%
1032	**PI603290**	97	3	2	100%	36	9	2	100%
1033	**PI603366**	89	45	3	75%	71	10	2	100%
1034	**PI603384**	51	33	2	63%	17	4	3	100%
1035	**PI603388**	45	31	4	69%	25	7	3	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
1036	**PI603392**	14	7	4	25%	12	5	4	25%
1037	**PI603393**	26	17	3	50%	129	22	3	100%
1038	**PI603394**	39	34	2	75%	27	14	5	100%
1039	**PI603395**	30	22	4	69%	19	13	2	88%
1040	**PI603396**	20	12	2	75%	18	1	4	75%
1041	**PI603398B**	4	1	2	100%	4	3	4	100%
1042	**PI603400**	0	-	0	-	69	43	3	83%
1043	**PI603402**	38	32	1	100%	104	64	3	100%
1044	**PI603406**	16	6	2	88%	15	8	2	100%
1045	**PI603408**	82	9	2	100%	30	-	1	100%
1046	**PI603415**	36	16	2	100%	91	63	2	100%
1047	**PI603418A**	90	67	1	100%	114	86	4	94%
1048	**PI603418B**	40	10	2	50%	37	15	4	100%
1049	**PI603418C**	16	8	3	25%	63	42	3	25%
1050	**PI603418D**	27	17	3	75%	135	77	3	92%
1051	**PI603421B**	45	4	2	100%	76	45	3	100%
1052	**PI603422B**	21	0	1	100%	51	34	3	100%
1053	**PI603423A**	157	81	4	75%	42	26	2	100%
1054	**PI603423B**	57	1	3	100%	100	77	3	92%
1055	**PI603424B**	38	0	2	100%	104	79	3	100%
1056	**PI603424C**	4	0	3	100%	36	27	4	75%
1057	**PI603424D**	21	1	3	75%	129	48	4	100%
1058	**PI603426F**	36	0	3	92%	193	159	3	100%
1059	**PI603427A**	31	5	2	88%	161	95	2	88%
1060	**PI603427B**	25	15	4	88%	32	13	2	100%
1061	**PI603427C**	33	29	4	94%	159	120	5	100%
1062	**PI603428A**	16	14	1	75%	15	2	3	92%
1063	**PI603428C**	82	60	3	75%	346	70	2	88%
1064	**PI603428D**	24	10	1	75%	22	2	4	88%
1065	**PI603429C**	87	48	3	100%	27	18	4	94%
1066	**PI603430B**	56	37	1	75%	189	149	4	100%
1067	**PI603431**	92	86	4	100%	67	-	1	100%
1068	**PI603432C**	0	0	3	92%	96	59	3	100%
1069	**PI603438A**	21	11	3	100%	0	0	4	50%
1070	**PI603438B**	90	73	1	100%	5	0	3	100%
1071	**PI603438E**	14	8	3	92%	107	91	2	100%
1072	**PI603439**	13	9	2	100%	4	1	3	92%
1073	**PI603440B**	83	41	2	88%	21	-	1	75%
1074	**PI603440C**	113	85	1	100%	0	0	4	88%
1075	**PI603442**	104	80	2	100%	255	150	3	92%
1076	**PI603443A**	112	21	3	92%	13	6	2	100%
1077	**PI603443B**	16	0	3	83%	115	11	2	100%
1078	**PI603444B**	46	13	3	75%	51	48	4	94%
1079	**PI548657**	58	54	1	50%	-	-	0	-
1080	**PI603445A**	79	63	1	100%	227	-	1	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
1081	**PI603447**	76	53	1	100%	186	32	2	100%
1082	**PI612729**	76	67	3	92%	26	20	3	83%
1083	**PI612730**	65	59	4	50%	-	-	0	-
1084	**PI612731**	54	51	3	75%	17	13	3	100%
1085	**PI612732**	81	65	2	88%	37	31	2	100%
1086	**PI612733**	78	74	3	100%	42	30	3	100%
1087	**PI612734**	78	41	4	88%	8	5	2	100%
1088	**PI612735**	10	6	2	100%	13	9	3	100%
1089	**PI612736**	49	25	3	100%	61	48	4	94%
1090	**PI612737**	99	86	2	100%	41	21	4	100%
1091	**PI612741**	50	32	1	75%	21	10	3	92%
1092	**PI612742**	0	-	0	-	18	5	3	92%
1093	**PI612743**	86	5	3	100%	14	5	3	100%
1094	**PI612744**	34	4	3	92%	18	2	3	100%
1095	**PI612746**	15	0	2	88%	20	15	3	100%
1096	**PI612747**	36	9	4	88%	40	14	2	100%
1097	**PI612748**	4	4	5	90%	8	6	3	92%
1098	**PI612749**	57	3	3	100%	66	41	2	100%
1099	**PI612750**	76	0	2	100%	68	46	2	100%
1100	**PI612752**	31	5	2	75%	-	-	0	-
1101	**PI612753B**	57	54	1	75%	8	6	5	100%
1102	**PI612754**	11	3	4	75%	0	0	3	100%
1103	**PI612758B**	75	66	2	75%	-	-	0	-
1104	**PI612759D**	16	14	2	75%	12	10	3	92%
1105	**PI612760**	33	14	3	75%	0	0	3	100%
1106	**PI612761B**	12	4	2	63%	12	9	3	92%
1107	**PI548480**	0	-	0	-	21	3	4	25%
1108	**PI548663**	9	6	1	25%	0	0	3	25%

PI: Plant Introduction, **MG:** Maturity Group, **MAX:** Maximum Number of Aphids per Leaflet
DI: Damaging Index, **Mean:** Average Number of Aphids on Three Leaflets

APPENDIX B

Germplasm used and data collected in 2002

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
1	**PI548300**	76	44.2	2	100%	20.1	27	3	100%
2	**PI548308**	34	20.2	5	100%	5.5	12	3	100%
3	**PI548312**	10	8.2	5	100%	5.3	7	3	92%
4	**PI548319**	65	25.8	3	92%	7.4	16	3	75%
5	**PI548328**	14	9.7	4	88%	1.3	3	3	83%
6	**PI548345**	1	1.5	5	100%	1.2	2	3	100%
7	**PI548363**	3	2.2	3	100%	1.9	4	2	88%
8	**PI548368**	16	16.7	4	94%	5.7	11	3	83%
9	**PI548371**	52	37.0	4	94%	9.7	31	2	75%
10	**PI548372**	54	13.0	5	100%	19.1	50	3	92%
11	**PI548369**	44	50.5	3	100%	0.0	0	3	75%
12	**PI548370**	56	37.8	4	100%	16.2	26	3	92%
13	**PI548374**	36	26.7	4	94%	24.1	39	3	92%
14	**PI548375**	30	17.5	5	80%	15.5	30	3	100%
15	**PI548378**	22	12.2	4	75%	14.0	20	3	92%
16	**PI548380**	1	1.8	4	100%	1.8	5	3	75%
17	**PI548391**	26	13.2	5	100%	10.9	17	1	75%
18	**PI548396**	33	16.2	2	100%	5.0	9	3	92%
19	**PI548406**	6	8.2	4	100%	3.7	6	3	75%
20	**PI548411**	41	12.7	3	83%	18.4	27	2	75%
21	**PI548424**	-	-	0	-	39.2	57	3	75%
22	**FC001547**	1	8.0	5	100%	11.4	31	3	83%
23	**PI030594**	98	56.3	1	100%	18.1	28	2	88%
24	**PI030599**	56	22.7	4	100%	19.5	27	3	100%
25	**PI030600**	4	1.7	1	75%	4.2	9	3	92%
26	**PI036653**	30	17.2	3	100%	2.7	7	3	100%
27	**PI047131**	8	2.5	4	100%	4.6	19	3	100%
28	**PI054604**	4	6.0	4	100%	0.0	0	3	100%
29	**PI054607**	20	12.5	2	100%	7.6	21	3	100%
30	**PI054608**	16	12.7	2	88%	-	-	0	-
31	**PI054608-1**	65	26.3	4	56%	10.4	23	3	92%
32	**PI054619**	0	0.0	1	75%	42.5	90	3	100%
33	**PI054818**	14	10.7	4	100%	5.4	11	3	100%
34	**PI054859**	23	9.3	4	100%	0.0	0	3	100%
35	**PI054862**	12	19.2	4	100%	4.2	11	3	83%
36	**PI054873**	2	2.0	3	100%	11.3	18	3	83%
37	**PI060279**	52	28.8	2	100%	16.7	35	3	75%
38	**PI065338**	18	11.3	3	100%	4.0	12	3	75%
39	**PI065341**	10	3.3	1	75%	10.2	28	3	75%
40	**PI065346**	20	8.5	4	100%	0.0	0	3	100%
41	**PI065354**	27	5.7	5	100%	0.0	0	3	83%
42	**PI065388**	0	2.0	2	100%	-	-	3	100%
43	**PI068421**	17	4.2	5	100%	0.0	0	3	75%
44	**PI068427**	28	13.2	3	100%	8.2	15	2	75%
45	**PI068430**	11	13.3	3	100%	2.8	5	2	100%

PI: Plant Introduction, **MG:** Maturity Group, **MAX:** Maximum Number of Aphids per Leaflet
DI: Damaging Index, **Mean:** Average Number of Aphids on Three Leaflets

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
46	**PI068436**	18	7.7	3	100%	0.6	2	2	100%
47	**PI068439**	1	18.3	5	100%	6.7	18	3	92%
48	**PI068443**	30	23.5	5	100%	7.4	9	3	67%
49	**PI068446**	12	8.5	5	95%	8.4	19	3	100%
50	**PI068448**	0	16.0	2	100%	11.0	23	2	63%
51	**PI068454**	27	13.3	2	100%	10.3	30	2	88%
52	**PI068455**	37	18.7	5	100%	31.9	65	3	100%
53	**PI068457**	31	33.5	5	100%	3.4	10	3	100%
54	**PI068457-1**	12	16.2	4	100%	10.5	35	3	75%
55	**PI068461**	1	7.5	4	100%	4.3	14	2	63%
56	**PI068461-1**	4	3.7	4	81%	7.9	15	2	100%
57	**PI068465**	11	14.3	5	95%	13.8	21	2	88%
58	**PI068465-1**	62	45.5	2	100%	5.0	14	2	100%
59	**PI068466**	36	23.3	5	95%	10.0	20	3	100%
60	**PI068474**	50	22.8	4	100%	9.3	19	2	88%
61	**PI068475**	62	32.8	4	100%	8.9	12	3	83%
62	**PI068475-1**	17	9.0	5	100%	31.4	62	3	83%
63	**PI068480**	0	16.0	5	100%	32.8	50	3	67%
64	**PI068481**	20	31.8	4	100%	12.7	25	2	75%
65	**PI068484-1**	10	6.3	2	88%	7.0	15	3	75%
66	**PI068484-4**	10	14.5	4	100%	34.6	62	2	88%
67	**PI068488**	61	31.5	5	65%	54.7	80	3	75%
68	**PI068500**	4	3.8	5	100%	40.9	66	3	75%
69	**PI068503**	12	14.7	4	100%	76.1	105	3	67%
70	**PI068508**	39	18.3	3	92%	29.1	50	3	92%
71	**PI068516**	32	30.0	5	100%	36.1	62	3	83%
72	**PI068521**	65	37.2	3	100%	6.4	14	3	83%
73	**PI068522**	38	18.0	5	95%	8.3	18	2	100%
74	**PI068526**	11	17.2	4	100%	2.8	9	3	92%
75	**PI068530**	10	13.0	3	100%	46.0	62	3	92%
76	**PI068543**	65	26.0	4	100%	51.3	62	3	92%
77	**PI068551-2**	21	17.2	5	90%	11.3	22	3	92%
78	**PI068555**	28	6.2	3	92%	29.5	38	3	92%
79	**PI068562**	43	16.2	5	90%	51.8	62	3	75%
80	**PI068564**	101	43.8	5	100%	47.6	65	3	75%
81	**PI068572**	11	10.7	5	100%	6.6	11	3	92%
82	**PI068585**	16	10.7	3	92%	26.8	52	3	100%
83	**PI068587**	37	29.2	4	100%	42.6	122	3	100%
84	**PI068598**	35	10.5	3	100%	18.2	35	3	92%
85	**PI068600**	67	37.8	4	100%	28.3	32	1	75%
86	**PI068609B**	28	11.7	3	92%	8.9	18	2	75%
87	**PI068610**	20	10.0	5	100%	7.5	23	3	100%
88	**PI068622**	13	7.2	4	63%	14.3	22	3	100%
89	**PI068627**	4	8.2	5	100%	4.4	9	3	83%
90	**PI068629**	29	11.7	4	88%	55.3	82	3	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
91	**PI068639**	35	26.2	5	100%	67.2	87	3	92%
92	**PI068642**	32	21.0	3	92%	28.5	52	3	83%
93	**PI068655**	60	34.5	3	92%	18.3	22	1	75%
94	**PI068658**	17	5.7	4	100%	19.2	35	3	83%
95	**PI068661**	20	13.7	5	100%	17.8	50	3	100%
96	**PI068663**	39	20.8	2	100%	51.8	62	3	83%
97	**PI068666**	52	49.5	3	100%	14.9	26	2	100%
98	**PI068670-1**	6	3.3	2	100%	3.3	9	2	88%
99	**PI068670-2**	48	26.8	4	100%	4.3	12	3	83%
100	**PI068671**	26	13.0	5	100%	28.8	62	3	92%
101	**PI068676**	0	0.0	4	56%	5.0	9	1	100%
102	**PI068680**	40	18.0	2	100%	89.5	150	3	100%
103	**PI068680-2**	10	5.3	4	94%	48.9	62	3	100%
104	**PI068683**	40	23.7	4	100%	114.5	150	1	100%
105	**PI068685**	53	26.3	4	100%	13.1	15	1	75%
106	**PI068687**	10	8.5	4	100%	0.5	3	3	92%
107	**PI068694**	11	4.2	2	100%	91.3	160	3	100%
108	**PI068696**	68	27.7	3	92%	95.1	170	3	100%
109	**PI068704**	71	39.2	4	100%	74.9	150	3	100%
110	**PI068706**	70	61.0	3	100%	186.1	300	3	100%
111	**PI068708**	21	14.5	3	92%	25.6	41	3	92%
112	**PI068709**	101	63.5	5	100%	41.5	90	3	83%
113	**PI068712**	6	21.0	5	100%	6.8	12	3	92%
114	**PI068713**	58	21.0	5	100%	5.2	11	3	92%
115	**PI068715**	23	10.3	5	95%	3.5	11	3	100%
116	**PI068718**	21	23.2	5	100%	21.5	36	3	100%
117	**PI068725**	36	40.8	3	100%	22.4	62	2	100%
118	**PI068728**	6	4.5	5	100%	30.1	55	3	83%
119	**PI068729**	60	35.7	3	100%	18.8	36	2	100%
120	**PI068732**	51	32.3	5	100%	17.5	22	3	92%
121	**PI068736**	39	31.2	3	100%	18.9	32	3	92%
122	**PI068741**	6	14.2	4	100%	24.0	50	3	83%
123	**PI068748**	-	-	0	-	47.7	68	2	100%
124	**PI068761**	15	10.8	5	100%	30.6	51	3	100%
125	**PI068762**	123	24.7	3	83%	9.8	18	2	100%
126	**PI068763**	24	17.5	4	100%	36.4	52	2	88%
127	**PI068765**	6	16.5	5	100%	65.5	150	2	100%
128	**PI068770**	12	13.8	4	94%	88.2	150	2	100%
129	**PI068778**	20	6.3	4	75%	22.5	31	1	100%
130	**PI068788**	5	6.2	4	63%	39.4	52	3	92%
131	**PI068795**	32	24.2	3	67%	25.2	38	2	100%
132	**PI068815**	28	24.2	2	100%	154.3	210	1	100%
133	**PI069500**	72	40.5	4	100%	39.3	58	3	92%
134	**PI069501**	80	23.7	4	100%	68.3	95	3	92%
135	**PI069503**	18	12.0	3	100%	24.4	36	3	92%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
136	**PI069512**	3	9.3	4	94%	23.5	46	3	83%
137	**PI069532**	41	29.0	2	88%	13.1	21	3	92%
138	**PI069991**	65	37.5	4	100%	18.3	42	3	83%
139	**PI069992**	75	38.7	2	100%	21.7	32	2	88%
140	**PI069996**	76	39.5	2	100%	10.8	20	3	100%
141	**PI070009**	73	42.0	5	100%	-	-	1	100%
142	**PI070016**	12	4.5	4	100%	12.0	18	3	92%
143	**PI070017**	34	35.2	5	95%	29.8	52	2	100%
144	**PI070021**	25	18.0	4	100%	8.3	22	3	92%
145	**PI070027**	10	6.3	1	100%	5.4	18	3	100%
146	**PI070036**	41	30.7	4	100%	30.5	61	3	92%
147	**PI070077**	60	41.8	4	81%	9.6	18	3	92%
148	**PI070078**	23	22.3	4	100%	0.0	0	3	83%
149	**PI070084**	2	9.2	3	83%	27.4	46	3	83%
150	**PI070087**	17	6.0	3	100%	35.4	57	2	100%
151	**PI070089**	10	5.2	5	85%	47.4	67	2	75%
152	**PI070091**	16	10.8	2	100%	53.3	88	3	100%
153	**PI070197**	15	9.3	4	94%	14.6	45	2	88%
154	**PI070224**	52	35.3	3	100%	43.8	63	2	100%
155	**PI070228**	14	21.2	5	100%	36.5	48	3	92%
156	**PI070241**	18	8.7	2	100%	40.7	59	3	100%
157	**PI070242**	18	23.7	5	100%	41.9	73	3	100%
158	**PI070251**	2	18.0	4	100%	19.8	35	2	100%
159	**PI070453**	44	31.7	2	100%	39.3	66	3	100%
160	**PI070456**	40	35.0	4	100%	13.9	19	1	75%
161	**PI070457**	34	34.5	3	92%	21.5	26	1	75%
162	**PI070458**	75	51.0	4	94%	46.1	78	3	100%
163	**PI070459**	103	52.8	4	100%	47.1	69	3	92%
164	**PI070460**	91	54.2	3	92%	1.7	4	3	75%
165	**PI070461**	62	47.2	4	100%	17.8	28	3	75%
166	**PI070463**	70	54.5	3	83%	6.4	14	3	83%
167	**PI070476**	58	49.3	4	94%	19.2	28	3	92%
168	**PI070478**	28	22.8	2	100%	42.3	46	2	100%
169	**PI070485**	55	42.5	3	100%	26.6	34	3	92%
170	**PI070495**	76	43.0	4	100%	38.4	70	2	100%
171	**PI070503**	103	64.2	3	100%	38.5	42	3	92%
172	**PI070507**	120	67.5	3	92%	34.6	43	3	92%
173	**PI070516**	28	26.0	5	100%	49.4	61	3	100%
174	**PI070520**	58	13.5	5	100%	34.3	48	3	92%
175	**PI070561**	41	19.7	3	83%	39.4	62	3	83%
176	**PI071850**	32	19.0	4	100%	31.5	39	3	75%
177	**PI072328**	6	5.8	5	100%	28.0	38	3	83%
178	**PI072337**	34	33.5	4	94%	51.1	61	3	92%
179	**PI072341**	90	31.8	4	100%	4.0	12	3	92%
180	**PI072342**	122	66.3	4	100%	32.3	45	2	88%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
181	**PI073583**	78	39.5	4	100%	34.1	51	3	92%
182	**PI073585**	26	26.7	3	100%	20.9	38	2	100%
183	**PI073587**	30	18.2	5	100%	13.6	19	2	100%
184	**PI073772**	42	21.0	5	100%	14.3	18	3	92%
185	**PI073780**	60	27.8	5	100%	19.4	28	3	92%
186	**PI079586**	61	52.3	1	100%	31.9	41	3	92%
187	**PI079593**	24	18.3	5	100%	11.9	18	3	75%
188	**PI079596**	28	40.5	5	95%	11.5	15	3	92%
189	**PI079602**	42	35.2	4	100%	35.4	41	3	92%
190	**PI079609**	61	44.3	4	94%	39.1	51	3	75%
191	**PI079610**	75	59.0	2	100%	47.0	60	2	75%
192	**PI079613**	92	64.7	4	94%	48.1	60	3	75%
193	**PI079694**	83	63.8	5	295%	0.0	0	1	75%
194	**PI079695**	101	61.7	2	100%	-	-	0	-
195	**PI079699**	62	48.7	5	100%	15.8	21	3	83%
196	**PI079703**	58	45.5	3	100%	33.3	38	3	83%
197	**PI079712**	42	39.3	3	100%	50.1	61	3	83%
198	**PI079727**	80	89.3	5	100%	11.0	18	2	75%
199	**PI079737**	37	33.0	5	95%	10.2	14	3	33%
200	**PI079745**	-	-	0	-	0.0	0	3	75%
201	**PI079746**	-	-	0	-	18.1	24	3	100%
202	**PI079747**	50	54.3	2	100%	13.2	21	2	88%
203	**PI079756**	20	19.8	5	100%	7.9	18	3	75%
204	**PI079761**	16	6.8	3	100%	28.1	38	2	100%
205	**PI079773**	12	25.5	2	100%	53.1	63	3	100%
206	**PI079846**	58	25.2	3	92%	28.2	37	3	92%
207	**PI079848**	32	34.0	2	88%	0.0	0	3	25%
208	**PI079862-1**	34	20.7	1	100%	0.0	0	3	25%
209	**PI079863**	84	51.3	4	100%	61.5	71	3	92%
210	**PI079885**	48	44.8	3	92%	9.1	18	3	83%
211	**PI080536**	61	53.0	2	88%	40.7	56	2	88%
212	**PI081763**	20	31.0	5	95%	0.0	0	3	75%
213	**PI081767**	101	76.7	3	92%	11.6	14	2	88%
214	**PI081768**	90	108.2	4	100%	8.3	18	3	92%
215	**PI081770**	72	59.3	5	90%	29.7	34	3	75%
216	**PI081771**	12	54.2	4	100%	19.6	28	3	75%
217	**PI085671**	56	47.8	5	100%	5.2	16	3	67%
218	**PI086741**	169	117.2	3	100%	24.2	30	3	83%
219	**PI086878**	53	23.7	4	100%	4.3	12	3	92%
220	**PI086878-2**	58	17.2	5	100%	0.0	0	3	100%
221	**PI087524**	2	2.5	5	100%	5.3	8	3	67%
222	**PI088288**	6	7.8	5	100%	17.0	23	3	75%
223	**PI088293**	10	12.3	4	94%	13.0	17	3	75%
224	**PI088293A**	22	11.3	4	94%	46.7	52	1	50%
225	**PI088294**	88	57.8	1	100%	26.9	40	3	75%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
226	**PI088294-1**	75	67.5	5	100%	37.5	52	3	75%
227	**PI088295-1**	58	50.5	4	100%	1.0	2	3	92%
228	**PI088296**	17	12.7	1	75%	1.8	6	3	100%
229	**PI088298**	72	51.0	4	100%	3.5	5	3	92%
230	**PI088301**	67	35.8	3	100%	4.2	7	3	75%
231	**PI088303**	75	38.7	4	88%	24.8	30	2	88%
232	**PI088304**	8	16.8	2	100%	10.7	25	2	75%
233	**PI088307**	33	15.0	4	100%	29.1	41	3	67%
234	**PI088308**	44	28.0	3	100%	15.0	26	3	42%
235	**PI088309**	28	21.7	2	100%	25.8	41	3	83%
236	**PI088311**	21	15.3	4	94%	2.3	3	3	58%
237	**PI088313**	21	15.7	4	94%	41.1	51	3	100%
238	**PI088351**	93	46.0	5	100%	45.4	56	3	92%
239	**PI088352**	43	60.8	2	100%	47.5	70	2	100%
240	**PI088355**	-	-	0	-	16.4	27	3	83%
241	**PI088356**	-	-	0	-	13.8	21	3	100%
242	**PI088357**	15	9.7	5	100%	21.8	40	3	83%
243	**PI088358**	22	37.7	5	95%	43.0	51	2	100%
244	**PI088442**	33	22.8	4	100%	40.8	51	3	83%
245	**PI088455**	36	25.2	2	100%	36.4	47	3	83%
246	**PI088468**	26	12.8	5	100%	44.9	56	2	88%
247	**PI088479**	85	68.3	5	90%	47.0	60	3	83%
248	**PI088495**	18	19.2	5	100%	13.0	35	2	75%
249	**PI088508**	1	4.0	4	100%	51.9	60	3	92%
250	**PI088777**	38	40.2	5	95%	46.2	70	3	100%
251	**PI088787**	78	40.7	5	100%	14.4	18	3	100%
252	**PI088798**	69	16.7	5	100%	6.0	16	3	83%
253	**PI088803**	66	25.3	3	100%	29.0	35	3	83%
254	**PI088805-4**	9	59.3	5	100%	5.0	16	2	88%
255	**PI088997**	31	30.5	4	100%	7.8	18	3	83%
256	**PI089000**	18	16.7	3	100%	32.2	40	3	92%
257	**PI089003-1**	60	42.3	5	100%	22.1	30	3	100%
258	**PI089004**	12	20.2	5	100%	6.7	16	3	92%
259	**PI089005-5**	59	41.5	3	100%	5.9	18	3	100%
260	**PI089006-2**	78	56.2	4	94%	19.7	25	3	75%
261	**PI089008**	98	76.0	3	100%	12.4	18	3	100%
262	**PI089012**	44	41.8	3	92%	20.6	39	3	100%
263	**PI089013**	101	79.7	3	83%	9.0	18	3	67%
264	**PI089014**	62	72.3	4	88%	23.1	30	3	83%
265	**PI089053**	39	39.0	4	100%	19.1	28	3	83%
266	**PI089055-1**	33	28.8	3	92%	14.4	20	3	75%
267	**PI089059**	31	15.2	5	90%	22.5	30	2	88%
268	**PI089063**	12	20.5	5	100%	12.4	18	3	83%
269	**PI089064**	53	49.8	3	92%	0.0	0	3	83%
270	**PI089065**	47	43.5	3	100%	-	-	0	-

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
271	**PI089065-2**	21	12.2	2	88%	28.8	40	1	75%
272	**PI089070**	61	26.0	3	92%	9.0	18	3	83%
273	**PI089072**	26	15.8	4	100%	5.0	8	3	83%
274	**PI089073**	44	30.7	5	90%	3.1	8	3	75%
275	**PI089075**	107	72.2	3	92%	8.8	18	3	92%
276	**PI089167**	23	31.0	4	100%	9.8	19	3	83%
277	**PI089170**	55	43.5	4	88%	11.9	16	3	92%
278	**PI089171**	14	34.7	4	100%	19.3	32	2	100%
279	**PI090560**	88	44.7	2	100%	15.8	42	3	100%
280	**PI090567**	61	34.0	3	92%	5.2	12	2	100%
281	**PI090570**	90	25.5	4	100%	15.8	23	3	100%
282	**PI090574**	7	6.0	1	100%	14.3	21	3	100%
283	**PI090575**	33	36.7	5	100%	12.2	18	3	92%
284	**PI091091**	49	46.5	3	100%	10.8	25	3	100%
285	**PI091102**	20	41.2	4	88%	6.5	18	2	88%
286	**PI091104**	37	49.3	4	100%	0.0	0	3	42%
287	**PI091107**	58	47.0	5	95%	10.9	18	3	92%
288	**PI091109**	9	33.8	5	100%	17.9	34	3	92%
289	**PI091110**	77	21.2	4	100%	26.3	31	3	92%
290	**PI091110-1**	102	88.8	3	100%	10.9	21	3	100%
291	**PI091114**	15	13.5	2	88%	11.8	18	3	92%
292	**PI091115**	150	81.8	4	100%	7.8	15	3	100%
293	**PI091116**	52	39.2	3	100%	16.8	26	3	100%
294	**PI091117**	58	27.5	4	100%	10.8	25	3	75%
295	**PI091119**	22	36.0	4	100%	11.5	29	3	92%
296	**PI091120**	68	46.7	4	94%	0.0	0	3	100%
297	**PI091120-2**	89	52.0	5	100%	6.0	18	3	92%
298	**PI091123**	23	32.7	4	100%	8.0	18	3	100%
299	**PI091124**	63	65.0	5	90%	4.1	8	3	100%
300	**PI091126**	99	53.3	5	100%	16.8	28	1	75%
301	**PI091129**	21	15.5	4	94%	0.9	2	2	100%
302	**PI091132-2**	26	25.7	5	100%	8.8	18	3	25%
303	**PI091138**	89	52.3	4	94%	6.4	14	3	100%
304	**PI091141**	59	56.5	5	100%	0.0	0	2	100%
305	**PI091144**	36	42.8	5	90%	1.5	4	2	100%
306	**PI091150**	60	39.0	3	100%	0.0	0	3	100%
307	**PI091156**	8	2.8	5	95%	15.7	23	2	100%
308	**PI091161**	113	67.2	4	100%	13.4	19	3	92%
309	**PI091164**	98	61.3	5	90%	62.5	70	3	83%
310	**PI091167**	-	-	0	-	38.9	45	1	75%
311	**PI091171**	39	57.8	4	94%	2.8	8	3	100%
312	**PI091180**	119	104.8	5	100%	0.0	0	3	25%
313	**PI091557**	75	80.8	5	100%	3.0	8	3	100%
314	**PI091559**	130	101.3	1	100%	6.9	18	2	100%
315	**PI091732-1**	41	38.2	2	88%	4.4	9	3	75%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
316	**PI091732-2**	8	36.5	3	100%	5.4	11	3	75%
317	**PI091733**	51	23.8	4	100%	2.6	5	3	83%
318	**PI092561**	120	88.0	2	100%	10.1	26	2	88%
319	**PI092563**	106	76.2	5	100%	0.0	0	3	58%
320	**PI092565**	36	37.5	4	94%	9.8	21	3	67%
321	**PI092569**	98	56.7	5	95%	5.5	9	3	67%
322	**PI092570**	81	48.7	3	100%	0.0	0	3	58%
323	**PI092571**	53	47.3	2	88%	0.0	0	2	63%
324	**PI092572**	37	15.2	3	92%	4.5	9	2	88%
325	**PI092573**	69	65.2	5	100%	0.0	0	2	75%
326	**PI092576**	28	27.2	3	92%	0.0	0	3	75%
327	**PI092580**	18	19.2	4	94%	0.0	0	3	58%
328	**PI092582**	51	21.7	3	100%	0.0	0	3	67%
329	**PI092583**	32	32.3	5	95%	0.0	0	2	63%
330	**PI092589**	54	38.3	4	94%	31.7	48	2	88%
331	**PI092592**	65	36.8	5	100%	5.7	11	3	92%
332	**PI092595**	15	25.7	4	94%	6.2	11	3	100%
333	**PI092596**	23	25.3	3	100%	10.2	15	2	88%
334	**PI092598**	40	17.7	0	-	4.5	9	3	67%
335	**PI092603**	26	11.0	4	94%	0.0	0	3	67%
336	**PI092607**	82	58.7	3	100%	0.0	0	3	67%
337	**PI092611**	91	43.7	5	100%	0.0	0	2	75%
338	**PI092625**	68	33.8	2	88%	0.0	0	3	25%
339	**PI092627**	65	38.2	3	100%	3.8	12	2	75%
340	**PI092629**	78	35.5	5	90%	9.9	18	2	88%
341	**PI092630**	32	64.5	3	92%	3.2	12	2	100%
342	**PI092633**	112	78.3	1	100%	16.1	30	3	100%
343	**PI092639**	38	17.7	5	100%	6.9	12	3	100%
344	**PI092649**	30	10.0	2	88%	3.7	8	3	83%
345	**PI092660**	40	32.0	1	100%	28.5	32	1	100%
346	**PI092661**	42	30.0	1	100%	-	-	0	-
347	**PI092671**	60	45.3	1	100%	25.6	32	1	100%
348	**PI092677**	52	28.7	5	100%	10.0	15	3	83%
349	**PI092681**	81	76.0	1	100%	16.8	20	1	100%
350	**PI092683**	0	8.7	4	100%	7.0	15	3	100%
351	**PI092684**	14	25.2	5	100%	1.6	13	3	58%
352	**PI092687**	43	26.0	3	92%	30.8	54	3	92%
353	**PI092694**	30	28.7	3	92%	0.0	0	3	92%
354	**PI092696**	11	4.2	5	95%	8.9	16	3	92%
355	**PI092698**	12	20.3	4	100%	-	-	0	-
356	**PI092705**	15	30.3	1	100%	12.7	18	1	100%
357	**PI092706**	81	52.5	3	100%	2.3	12	3	83%
358	**PI092717**	71	33.5	5	95%	14.2	22	3	75%
359	**PI092719**	52	33.0	4	100%	12.3	21	3	92%
360	**PI092733**	46	38.0	4	94%	9.5	21	2	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
361	**PI092734**	72	35.2	5	100%	6.9	13	3	92%
362	**PI093559**	28	42.3	4	100%	8.5	17	3	92%
363	**PI093560**	85	30.8	3	92%	11.5	17	3	83%
364	**PI093565**	71	40.8	3	100%	1.3	4	3	25%
365	**PI096188**	65	35.0	4	100%	18.6	22	3	100%
366	**PI096195**	56	49.8	4	94%	18.2	32	3	100%
367	**PI096201**	-	-	0	-	24.8	36	2	88%
368	**PI103414**	101	76.5	2	100%	24.4	42	3	100%
369	**PI135589**	101	60.8	4	100%	17.5	32	3	100%
370	**PI135590**	30	11.5	5	95%	27.4	36	3	92%
371	**PI142491**	69	39.8	5	100%	22.6	30	3	83%
372	**PI200592**	111	88.0	3	92%	10.8	16	3	100%
373	**PI200596**	92	79.8	4	94%	18.8	23	3	92%
374	**PI232987**	15	34.3	5	100%	24.5	42	3	83%
375	**PI232988**	20	24.0	2	100%	22.3	25	1	100%
376	**PI232989**	0	0.3	5	100%	6.3	13	3	83%
377	**PI232990**	56	20.3	4	100%	14.3	26	3	83%
378	**PI232991**	1	0.8	4	100%	16.9	25	3	83%
379	**PI261474**	27	24.0	3	92%	33.2	53	3	100%
380	**PI266085A**	13	13.8	3	100%	8.4	23	3	100%
381	**PI266085B**	93	58.7	3	100%	6.5	15	3	83%
382	**PI266085C**	21	13.3	1	100%	20.9	41	3	100%
383	**PI266806A**	19	4.0	2	88%	21.0	31	3	83%
384	**PI266806B**	17	18.5	2	100%	19.3	25	3	100%
385	**PI266806C**	14	2.5	5	100%	-	-	0	-
386	**PI266807A**	56	21.5	2	100%	19.6	24	3	92%
387	**PI266807B**	54	16.8	4	100%	7.1	17	3	92%
388	**PI291272**	0	3.2	4	100%	7.7	10	3	75%
389	**PI291273**	0	22.7	4	100%	3.7	8	3	92%
390	**PI291274A**	33	11.3	5	95%	0.0	0	3	25%
391	**PI291274B**	23	14.8	5	100%	12.1	28	3	75%
392	**PI291275**	56	37.3	3	100%	6.2	15	3	75%
393	**PI291276**	112	51.5	5	100%	6.8	16	3	75%
394	**PI291277**	15	8.5	5	100%	2.2	7	3	75%
395	**PI291278**	12	10.5	5	100%	18.8	32	3	100%
396	**PI291279**	80	19.3	3	100%	8.1	18	3	92%
397	**PI291281**	14	7.0	4	100%	5.5	16	3	92%
398	**PI291282**	27	13.7	4	100%	1.5	10	3	92%
399	**PI291283**	14	6.3	4	100%	0.3	1	3	75%
400	**PI291284**	11	9.5	3	100%	8.3	17	3	83%
401	**PI291286**	64	26.7	5	100%	1.8	6	3	75%
402	**PI291288**	26	13.2	2	100%	3.0	9	3	58%
403	**PI291290**	165	59.7	3	100%	5.2	17	3	83%
404	**PI291291**	23	11.0	1	100%	0.3	1	3	83%
405	**PI291293A**	196	77.7	4	100%	4.4	12	3	75%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
406	**PI291293B**	50	23.8	4	100%	7.9	24	3	100%
407	**PI291294**	37	12.0	4	94%	9.1	21	2	88%
408	**PI291295**	8	16.0	4	100%	12.5	38	2	75%
409	**PI291296**	32	17.0	1	100%	13.9	30	3	92%
410	**PI291297**	21	13.8	4	100%	7.3	17	3	92%
411	**PI291298**	38	29.8	3	100%	8.5	23	3	75%
412	**PI291299**	19	21.2	5	100%	3.3	8	3	75%
413	**PI291300**	22	7.5	4	100%	0.9	3	2	50%
414	**PI291301**	37	10.5	5	95%	7.4	20	3	92%
415	**PI291302A**	0	0.8	4	81%	4.2	14	3	75%
416	**PI291302B**	0	2.3	3	100%	5.3	18	3	25%
417	**PI291302C**	-	-	0	-	-	-	0	-
418	**PI291303A**	17	12.7	5	100%	14.1	44	3	83%
419	**PI291303B**	22	9.3	5	100%	2.5	8	2	100%
420	**PI291304**	27	34.3	2	100%	6.8	10	3	92%
421	**PI291305**	104	53.5	3	92%	11.7	29	2	100%
422	**PI291306A**	7	1.5	5	100%	10.8	27	2	75%
423	**PI291309A**	5	3.8	3	100%	6.3	21	2	75%
424	**PI291309B**	17	3.5	4	100%	10.6	30	3	58%
425	**PI291309C**	89	30.2	5	95%	7.1	24	3	75%
426	**PI291309D**	115	88.8	5	90%	18.1	29	3	100%
427	**PI291310A**	64	42.5	4	100%	17.9	45	3	92%
428	**PI291310B**	23	6.5	4	100%	22.8	32	3	92%
429	**PI291310C**	128	87.3	5	100%	11.7	27	2	75%
430	**PI291311B**	80	27.8	4	88%	19.0	27	2	100%
431	**PI291315**	66	48.3	5	300%	10.0	17	2	100%
432	**PI291320A**	59	20.7	3	100%	25.6	48	3	100%
433	**PI291322**	22	15.3	1	100%	23.0	43	2	100%
434	**PI291323**	26	44.5	2	100%	13.8	26	3	83%
435	**PI291324**	78	75.7	2	100%	6.2	18	3	83%
436	**PI291327**	67	60.7	4	100%	20.7	33	3	100%
437	**PI291328**	30	19.7	5	100%	3.3	10	2	100%
438	**PI297500**	117	68.7	4	100%	8.0	13	2	100%
439	**PI361074**	120	97.0	5	100%	12.0	18	3	100%
440	**PI361075**	140	101.7	4	100%	9.9	19	3	100%
441	**PI372404A**	-	-	0	-	29.3	48	3	100%
442	**PI372404C**	117	90.7	4	94%	5.1	12	3	100%
443	**PI383276**	69	32.2	4	100%	5.4	12	3	100%
444	**PI383277**	48	55.2	3	92%	23.1	50	3	100%
445	**PI383278**	15	6.3	5	100%	7.5	14	3	100%
446	**PI391577**	68	32.0	2	75%	16.9	22	1	100%
447	**PI391578**	-	-	0	-	19.2	32	3	100%
448	**PI391581A**	97	52.5	2	100%	31.5	52	3	100%
449	**PI391581B**	72	52.5	3	100%	26.1	33	3	100%
450	**PI391583**	105	68.7	4	94%	18.9	51	3	83%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
451	**PI391584**	78	56.2	3	100%	13.1	23	3	100%
452	**PI391585**	30	17.3	4	100%	14.7	35	3	100%
453	**PI391589A**	98	72.8	4	100%	18.8	39	3	100%
454	**PI391589B**	68	54.3	2	88%	25.0	58	2	100%
455	**PI391594**	19	12.5	2	75%	17.1	35	2	100%
456	**PI393541B**	41	39.2	4	100%	11.5	21	3	100%
457	**PI393563**	133	92.8	3	100%	20.3	33	3	100%
458	**PI393999**	120	111.7	1	100%	22.4	35	3	100%
459	**PI405690**	107	56.3	5	100%	44.0	55	2	88%
460	**PI407701**	-		0		31.3	43	3	83%
461	**PI407704**	78	37.2	3	92%	41.5	57	3	92%
462	**PI407705**	1	10.7	3	100%	20.5	25	1	75%
463	**PI407706A**	16	11.0	1	100%	20.5	30	2	100%
464	**PI407706B**	136	79.7	1	100%	19.0	26	3	100%
465	**PI407710**	96	27.0	2	100%	17.7	22	3	100%
466	**PI407711A**	122	112.7	1	100%	19.4	31	3	100%
467	**PI407711B**	-	-	2	88%	0.0	0	3	25%
468	**PI407712**	-	-	0	-	15.8	21	3	100%
469	**PI407714**	56	32.2	3	100%	12.6	22	2	88%
470	**PI407715**	120	65.7	4	88%	16.9	26	3	100%
471	**PI407716**	75	53.2	2	100%	16.8	27	3	100%
472	**PI407717**	130	71.5	3	92%	30.5	40	3	100%
473	**PI407718**	124	84.2	2	100%	21.2	30	3	100%
474	**PI407719**	77	43.3	2	100%	13.6	20	3	100%
475	**PI407720**	98	92.3	4	100%	14.8	19	3	100%
476	**PI407721**	117	112.0	1	100%	12.0	16	3	100%
477	**PI407723**	69	52.8	2	100%	20.8	32	3	100%
478	**PI407724**	101	24.2	5	100%	10.4	12	3	100%
479	**PI407726**	23	14.5	2	100%	11.2	18	3	83%
480	**PI415072**	16	11.7	1	100%	30.2	35	3	83%
481	**PI415073B**	23	19.3	2	100%	0.0	0	3	100%
482	**PI415074**	12	17.3	5	100%	5.8	12	3	100%
483	**PI424201**	12	41.2	2	100%	14.2	32	3	100%
484	**PI424204**	17	44.5	2	100%	0.0	0	3	100%
485	**PI427088A**	25	19.0	1	100%	10.4	26	3	100%
486	**PI427088B**	18	16.3	4	100%	9.8	29	3	83%
487	**PI427088C**	1	6.3	5	100%	4.0	9	3	83%
488	**PI427088D**	30	18.5	4	88%	23.5	50	3	83%
489	**PI427088E**	40	68.8	4	100%	8.6	18	3	83%
490	**PI427088F**	52	27.8	4	100%	4.8	9	3	100%
491	**PI427088G**	13	5.0	2	75%	20.1	29	3	100%
492	**PI427088H**	21	4.8	2	100%	12.0	24	3	100%
493	**PI427088I**	20	14.3	4	100%	0.0	0	1	25%
494	**PI427099**	63	35.5	2	100%	10.9	34	3	100%
495	**PI427105A**	91	48.7	4	100%	4.1	6	3	100%

PI: Plant Introduction, **MG:** Maturity Group, **MAX:** Maximum Number of Aphids per Leaflet
DI: Damaging Index, **Mean:** Average Number of Aphids on Three Leaflets

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
496	**PI427105B**	11	13.5	3	100%	5.0	18	2	100%
497	**PI427106**	72	52.7	1	100%	2.3	8	2	88%
498	**PI427107A**	98	84.3	3	100%	21.6	35	3	100%
499	**PI427107B**	18	21.8	3	100%	25.0	44	3	92%
500	**PI427107C**	17	30.2	3	100%	1.2	4	3	100%
501	**PI430460A**	13	12.5	5	100%	13.9	37	3	100%
502	**PI430460B**	28	23.3	4	100%	10.3	26	3	100%
503	**PI436617**	35	16.8	5	100%	8.4	15	3	100%
504	**PI436681**	65	53.8	4	100%	6.3	12	3	100%
505	**PI436682**	42	26.0	4	94%	8.8	14	3	100%
506	**PI436683**	48	14.5	5	100%	7.0	16	3	92%
507	**PI436684**	10	3.2	2	88%	0.0	0	3	67%
508	**PI437105A**	18	10.2	4	94%	18.1	42	3	92%
509	**PI437105B**	5	13.5	5	100%	18.8	26	3	83%
510	**PI437105C**	28	7.8	5	100%	1.0	2	3	75%
511	**PI437105D**	40	27.2	4	94%	14.1	33	3	83%
512	**PI437568**	72	32.5	4	100%	28.3	47	3	75%
513	**PI437569**	85	43.5	2	100%	9.4	15	3	100%
514	**PI437572**	2	16.2	5	100%	2.0	7	3	83%
515	**PI437589**	45	22.8	5	100%	13.5	28	3	50%
516	**PI437656**	48	27.5	4	100%	16.9	21	3	75%
517	**PI437662**	25	19.0	4	94%	4.8	10	3	75%
518	**PI437663**	17	13.5	4	100%	28.9	68	3	100%
519	**PI437664**	45	42.2	5	100%	0.0	0	3	25%
520	**PI437722**	120	95.0	2	100%	0.0	0	3	25%
521	**PI437738B**	130	137.5	5	100%	0.0	0	3	25%
522	**PI437814A**	120	112.5	3	100%	0.0	0	3	25%
523	**PI437814B**	55	33.5	3	100%	0.0	0	3	25%
524	**PI437815**	40	100.0	2	100%	1.5	5	3	25%
525	**PI437817**	9	18.5	3	100%	0.0	0	3	25%
526	**PI437818A**	-	-	0	-	6.3	16	3	25%
527	**PI437818B**	20	37.5	5	50%	0.0	0	3	25%
528	**PI437819**	80	115.0	1	75%	20.8	24	1	75%
529	**PI437820**	40	42.5	5	90%	0.0	0	3	25%
530	**PI437821**	1	30.5	4	94%	0.0	0	3	25%
531	**PI437822**	15	7.5	5	90%	0.0	0	3	25%
532	**PI437823**	25	40.0	4	100%	0.0	0	3	25%
533	**PI437824**	16	38.0	4	100%	0.0	0	3	25%
534	**PI437825**	50	85.0	5	90%	-	-	3	25%
535	**PI437827**	11	6.0	3	100%	0.0	0	3	25%
536	**PI437828**	1	11.0	3	100%	-	-	3	25%
537	**PI437905**	30	52.5	2	100%	0.0	0	3	25%
538	**PI437913**	15	17.5	5	100%	3.3	5	3	50%
539	**PI452433**	300	-	4	100%	3.2	5	3	33%
540	**PI458505**	10	15.0	4	81%	4.7	11	3	25%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
541	**PI458506**	25	18.5	5	100%	10.3	22	3	58%
542	**PI458507**	4	2.0	5	75%	3.7	6	3	25%
543	**PI458508A**	65	47.5	4	100%	2.2	7	3	58%
544	**PI458508B**	0	7.5	5	100%	6.1	14	3	75%
545	**PI458511**	40	20.0	5	100%	0.0	0	3	25%
546	**PI458512**	50	32.5	3	100%	14.3	30	3	92%
547	**PI458517**	5	2.5	2	88%	6.1	8	1	75%
548	**PI458519A**	85	42.5	4	100%	10.0	20	3	100%
549	**PI458520**	20	30.0	4	100%	11.1	21	3	100%
550	**PI458522**	5	15.0	5	85%	21.7	36	3	92%
551	**PI458525**	45	45.0	3	100%	29.5	55	3	75%
552	**PI458529**	12	8.5	4	100%	10.5	31	3	92%
553	**PI458532B**	0	15.0	4	100%	13.4	38	3	92%
554	**PI458541**	0	12.5	5	100%	12.9	37	3	100%
555	**PI458829**	0	5.0	5	100%	24.4	31	3	100%
556	**PI461508**	5	2.5	4	100%	18.0	25	2	100%
557	**PI461509**	1	1.5	4	94%	11.7	25	3	83%
558	**PI464865**	12	12.0	1	100%	6.0	13	2	100%
559	**PI464878**	10	25.0	2	100%	17.3	46	3	83%
560	**PI464880**	10	8.0	2	100%	8.0	12	3	100%
561	**PI464882**	12	6.0	5	100%	18.8	29	3	83%
562	**PI464883**	16	13.0	4	94%	23.3	50	3	92%
563	**PI464884**	3	21.5	2	100%	11.9	23	3	92%
564	**PI464887**	20	25.0	3	100%	14.8	26	3	83%
565	**PI464888A**	20	20.0	3	100%	10.4	17	3	83%
566	**PI464888B**	15	8.0	5	100%	28.0	73	3	100%
567	**PI464893**	3	3.0	3	100%	15.9	53	3	100%
568	**PI464894**	10	3.2	2	100%	5.6	14	3	100%
569	**PI464895**	-	-	0	-	0.0	0	3	100%
570	**PI464896**	20	9.3	3	100%	11.2	32	3	100%
571	**PI464897**	2	7.7	3	100%	0.0	0	3	33%
572	**PI464898**	-	-	0	-	26.0	45	3	100%
573	**PI464899**	43	22.2	2	100%	7.4	14	3	100%
574	**PI464901**	35	17.3	4	100%	26.9	50	3	100%
575	**PI464904**	19	7.8	5	100%	12.5	29	3	100%
576	**PI464905**	38	16.8	3	100%	8.8	18	3	100%
577	**PI464909**	38	41.7	5	100%	33.3	45	2	88%
578	**PI464914A**	14	16.0	3	83%	24.4	36	2	100%
579	**PI464914A**	8	4.8	3	100%	19.7	24	3	100%
580	**PI464915A**	10	10.7	4	100%	15.8	32	2	88%
581	**PI464915B**	24	18.5	3	100%	29.5	41	3	92%
582	**PI464917**	49	18.0	4	100%	32.3	41	2	100%
583	**PI464921**	13	14.8	3	100%	42.3	52	3	92%
584	**PI464922**	10	10.0	1	100%	25.0	40	2	100%
585	**PI464924**	40	47.5	2	100%	36.9	50	2	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
586	**PI464940**	40	40.0	1	100%	38.3	52	3	100%
587	**PI464941**	60	42.5	5	100%	18.0	38	2	100%
588	**PI467307**	5	20.0	3	100%	27.2	32	2	88%
589	**PI467308A**	4	5.5	3	100%	39.3	50	2	100%
590	**PI467308B**	30	25.0	3	100%	26.0	30	2	88%
591	**PI467310**	45	52.5	4	100%	20.1	40	2	88%
592	**PI467311A**	250	-	2	100%	21.1	36	3	100%
593	**PI467311B**	60	60.0	3	100%	26.6	41	3	100%
594	**PI467311C**	225	225.0	1	100%	17.9	23	1	75%
595	**PI467311D**	20	20.0	1	100%	28.8	41	2	100%
596	**PI467311E**	40	35.0	5	100%	23.8	36	3	75%
597	**PI467312**	30	25.0	5	100%	6.8	21	1	25%
598	**PI467314**	20	22.5	5	100%	22.3	28	3	92%
599	**PI467315**	1	20.5	5	100%	20.8	32	2	100%
600	**PI467317**	120	100.0	4	88%	20.4	30	3	92%
601	**PI467318A**	54	39.3	1	100%	18.0	26	3	100%
602	**PI467318B**	32	12.4	5	80%	10.5	16	3	92%
603	**PI467320**	38	22.8	3	100%	24.7	40	3	100%
604	**PI467321**	5	7.8	2	100%	27.1	36	3	100%
605	**PI467322A**	32	22.0	1	75%	11.0	21	3	92%
606	**PI467322B**	18	13.8	2	100%	8.3	15	2	100%
607	**PI467323B**	21	10.3	5	100%	8.8	21	3	100%
608	**PI467324**	6	3.2	4	100%	24.6	38	3	100%
609	**PI467325**	36	15.8	2	100%	15.2	24	3	100%
610	**PI467327**	62	37.0	4	100%	23.7	45	3	92%
611	**PI467328**	8	4.5	3	92%	17.0	28	3	92%
612	**PI467329**	49	12.8	5	100%	19.0	27	2	100%
613	**PI467330**	1	2.7	2	100%	17.0	22	3	92%
614	**PI467331**	13	9.5	4	100%	16.5	26	3	100%
615	**PI467332**	8	5.2	3	75%	16.5	32	3	83%
616	**PI467333**	38	39.2	5	100%	11.9	15	3	83%
617	**PI467334A**	58	49.5	2	100%	6.7	15	2	100%
618	**PI467334B**	-	-	0	-	8.6	15	1	100%
619	**PI467335A**	72	31.0	5	100%	22.1	32	3	92%
620	**PI467335B**	102	82.7	2	100%	14.9	21	2	100%
621	**PI467336**	92	41.3	2	100%	11.7	21	2	100%
622	**PI467337**	8	14.0	4	100%	9.7	12	3	100%
623	**PI467338**	20	19.2	2	100%	0.3	1	3	50%
624	**PI467339**	36	15.0	5	100%	12.7	26	3	100%
625	**PI467340**	70	39.3	4	94%	9.0	13	3	92%
626	**PI467341**	100	69.3	2	88%	7.4	22	3	100%
627	**PI467342**	30	31.5	4	94%	12.7	17	3	100%
628	**PI467343**	79	56.3	3	92%	30.2	45	3	100%
629	**PI467346**	52	30.8	4	100%	8.0	18	3	100%
630	**PI467347**	27	22.5	3	100%	0.3	1	1	75%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
631	**PI468378**	116	86.8	3	100%	16.6	25	3	100%
632	**PI468408A**	88	42.7	2	88%	8.2	14	2	100%
633	**PI468408B**	140	49.5	4	100%	10.2	15	3	100%
634	**PI468903**	48	49.0	5	90%	16.7	38	3	92%
635	**PI468907**	30	38.3	0	-	6.5	13	3	92%
636	**PI468915**	20	12.3	3	75%	13.3	17	2	100%
637	**PI468920**	30	17.3	1	100%	16.0	27	2	100%
638	**PI468921**	15	16.8	3	100%	15.9	22	1	100%
639	**PI470221**	89	45.2	3	100%	0.0	0	3	100%
640	**PI470222**	53	26.2	3	100%	10.5	24	3	92%
641	**PI470223**	136	116.8	5	100%	15.5	30	3	100%
642	**PI470224**	116	83.3	5	100%	15.2	19	3	100%
643	**PI470225**	110	57.0	4	88%	15.8	25	3	100%
644	**PI470227A**	116	71.0	4	100%	15.2	25	3	100%
645	**PI473573**	102	97.3	1	100%	2.4	4	1	75%
646	**PI475829A**	81	76.0	5	75%	11.5	19	3	100%
647	**PI479709**	89	78.8	2	88%	13.5	24	3	100%
648	**PI479710**	36	40.5	3	83%	25.3	38	3	100%
649	**PI479711**	71	27.2	4	75%	20.8	32	3	25%
650	**PI479712**	20	25.7	4	100%	10.9	20	3	100%
651	**PI479713**	88	41.3	3	83%	12.2	23	2	100%
652	**PI479714**	110	102.8	4	100%	15.8	23	3	83%
653	**PI479717**	28	26.5	4	94%	16.0	31	2	100%
654	**PI479718A**	85	62.5	4	81%	17.0	23	3	100%
655	**PI479718B**	26	15.2	4	94%	8.8	14	3	100%
656	**PI479719**	115	82.0	1	100%	8.7	22	3	100%
657	**PI479721**	97	73.8	5	100%	5.9	22	3	100%
658	**PI479723**	102	78.2	4	94%	23.9	48	3	100%
659	**PI479724A**	104	92.3	3	92%	17.1	31	3	100%
660	**PI479724B**	78	76.7	3	100%	10.2	20	2	100%
661	**PI479725A**	160	133.7	4	94%	6.5	11	3	100%
662	**PI479725B**	112	108.2	4	100%	18.8	30	3	92%
663	**PI479726**	-	-	5	100%	10.7	60	3	92%
664	**PI479727**	44	78.2	1	100%	28.6	41	3	75%
665	**PI479728A**	109	92.0	4	100%	7.7	16	3	83%
666	**PI479728B**	196	55.0	2	100%	9.1	18	3	100%
667	**PI479731**	106	84.7	5	90%	12.8	32	3	92%
668	**PI479732**	175	18.7	2	100%	15.3	28	3	83%
669	**PI479734**	150	91.0	4	100%	8.8	18	2	88%
670	**PI479736**	6	3.3	2	100%	15.8	22	3	100%
671	**PI479737**	66	29.3	5	100%	13.5	29	3	100%
672	**PI479738**	110	65.8	2	100%	1.3	3	3	100%
673	**PI479742**	150	36.8	2	88%	5.9	11	3	92%
674	**PI479743**	78	29.8	4	100%	4.0	8	3	92%
675	**PI479758**	71	34.0	3	100%	0.0	0	3	25%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
676	**PI479759**	78	54.8	3	100%	6.6	18	3	100%
677	**PI479762**	36	32.8	4	100%	7.6	14	3	100%
678	**PI483459**	124	32.2	4	75%	11.6	18	3	100%
679	**PI491548**	150	58.7	4	100%	12.8	21	3	100%
680	**PI491579**	31	16.0	4	100%	9.9	19	3	100%
681	**PI503333**	66	50.0	3	100%	0.0	0	3	100%
682	**PI503337**	-	-	0	-	-	-	0	-
683	**PI503338**	66	43.0	1	100%	0.0	0	3	100%
684	**PI503340**	26	33.3	5	100%	17.3	34	3	92%
685	**PI518703**	9	9.0	5	100%	10.7	23	2	100%
686	**PI518706C**	32	16.5	3	100%	3.5	12	2	88%
687	**PI518707**	64	31.4	5	100%	6.3	18	3	100%
688	**PI518708**	43	29.2	1	100%	2.6	9	3	100%
689	**PI518709**	36	14.7	3	100%	5.2	12	3	92%
690	**PI518710**	20	7.0	4	88%	6.9	18	3	100%
691	**PI518711**	29	19.5	3	75%	0.0	0	3	100%
692	**PI518712**	17	19.3	2	100%	11.7	32	2	100%
693	**PI518718A**	15	9.5	3	100%	7.8	18	3	92%
694	**PI518718B**	15	6.0	4	100%	22.5	55	3	92%
695	**PI532434**	100	6.3	5	100%	7.3	18	3	100%
696	**PI532439**	38	21.0	2	88%	1.2	3	3	100%
697	**PI532441A**	150	33.6	4	100%	2.1	6	3	100%
698	**PI532441B**	22	13.7	4	100%	6.8	16	3	100%
699	**PI532443**	60	30.8	3	83%	17.9	32	3	100%
700	**PI532444A**	200	99.0	3	92%	6.9	18	3	100%
701	**PI532444B**	200	34.0	4	100%	0.0	0	3	25%
702	**PI532447**	182	118.2	5	95%	13.1	18	3	100%
703	**PI532464**	250	-	5	100%	2.4	7	3	100%
704	**PI532465**	200	40.0	4	100%	20.9	50	3	100%
705	**PI538387**	100	51.0	4	100%	15.5	21	3	100%
706	**PI538387**	100	78.0	5	100%	21.6	50	3	100%
707	**PI538394**	150	59.0	4	100%	0.9	4	2	100%
708	**PI538400**	150	100.0	4	100%	19.0	32	2	100%
709	**PI549041B**	0	29.8	2	75%	0.0	0	2	75%
710	**PI549042B**	-	-	5	75%	6.7	12	2	75%
711	**PI561230**	110	76.7	3	100%	10.5	18	2	100%
712	**PI561233B**	88	75.3	4	100%	5.4	16	3	100%
713	**PI561233C**	103	28.2	4	100%	5.8	11	3	100%
714	**PI561240**	22	14.3	1	100%	15.8	18	1	100%
715	**PI561284**	-	-	0	-	0.0	0	2	100%
716	**PI561285A**	89	95.0	3	100%	0.0	0	3	100%
717	**PI561307**	108	66.2	4	100%	6.5	12	3	92%
718	**PI561314A**	93	45.7	2	100%	0.0	0	1	25%
719	**PI561326**	-	166.0	1	100%	20.3	50	3	100%
720	**PI561327A**	24	63.0	3	100%	1.3	4	3	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
721	**PI561327B**	89	82.3	5	95%	12.0	23	3	100%
722	**PI561327C**	18	51.3	4	94%	13.6	21	3	100%
723	**PI561327D**	55	25.8	5	100%	18.2	36	3	100%
724	**PI561335**	173	72.0	2	88%	17.5	28	3	100%
725	**PI561353**	36	11.5	5	100%	18.6	30	3	100%
726	**PI561354**	116	74.2	2	88%	9.5	30	2	100%
727	**PI561367**	33	67.8	3	100%	4.5	18	3	25%
728	**PI567156B**	117	91.0	1	100%	23.3	30	2	88%
729	**PI567159A**	112	34.7	4	100%	22.5	32	3	100%
730	**PI567159B**	103	100.7	3	100%	41.4	52	3	100%
731	**PI567160**	0	0.3	5	100%	15.1	22	2	100%
732	**PI567161**	115	153.8	3	100%	8.2	16	3	100%
733	**PI567162**	66	71.7	3	100%	14.6	33	3	100%
734	**PI567166**	260	231.8	3	100%	16.3	28	3	100%
735	**PI567168**	126	194.8	4	100%	11.0	18	3	100%
736	**PI567169**	45	22.3	2	100%	1.0	6	2	100%
737	**PI567170A**	50	25.3	4	100%	11.7	20	3	100%
738	**PI567170B**	22	13.0	3	100%	15.9	25	3	100%
739	**PI567175C**	130	117.3	1	100%	15.3	18	1	100%
740	**PI567288A**	95	76.5	4	100%	5.3	10	3	100%
741	**PI567293**	115	69.5	3	100%	3.6	12	3	100%
742	**PI567313**	170	112.8	3	92%	6.5	10	3	92%
743	**PI567323A**	130	90.5	2	100%	12.4	23	3	100%
744	**PI567323B**	90	82.3	1	100%	9.2	16	3	100%
745	**PI567323C**	124	107.7	1	100%	12.7	36	3	100%
746	**PI567325A**	48	69.5	5	95%	9.9	18	2	100%
747	**PI567351A**	17	12.8	4	94%	12.0	20	3	92%
748	**PI567480A**	82	51.8	4	100%	1.7	10	2	88%
749	**PI567480B**	52	41.0	1	75%	10.2	18	2	100%
750	**PI567481**	132	125.7	2	100%	13.1	25	2	100%
751	**PI567485**	77	53.7	3	92%	15.1	32	2	100%
752	**PI567486A**	112	108.3	2	100%	13.9	15	1	100%
753	**PI567486B**	160	114.8	4	88%	0.0	0	3	25%
754	**PI567504**	62	52.2	3	100%	22.8	58	2	100%
755	**PI567505**	161	168.0	3	92%	24.9	30	3	100%
756	**PI567507A**	51	38.7	1	100%	12.4	14	1	100%
757	**PI567507B**	32	16.8	4	94%	15.7	20	1	50%
758	**PI567512A**	14	10.7	4	94%	12.3	23	2	75%
759	**PI567512B**	106	59.0	4	88%	18.3	30	3	83%
760	**PI567515**	17	7.5	3	75%	15.7	20	2	88%
761	**PI567516A**	48	21.2	4	88%	14.0	28	3	75%
762	**PI567519**	34	25.2	3	92%	16.2	31	2	75%
763	**PI567520A**	13	11.7	3	67%	0.0	0	3	25%
764	**PI567520B**	8	3.3	5	55%	16.9	28	3	25%
765	**PI567525**	100	37.8	3	83%	22.8	30	2	63%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
766	**PI567526**	124	63.3	2	88%	18.8	22	1	75%
767	**PI567528A**	250	-	2	75%	18.8	22	1	50%
768	**PI567528B**	130	81.0	1	50%	23.8	31	2	75%
769	**PI567529**	200	81.0	1	75%	13.4	26	2	63%
770	**PI567537**	8	3.3	3	33%	1.1	2	3	25%
771	**PI567538A**	0	0.0	5	45%	0.0	0	3	33%
772	**PI567538B**	200	65.0	1	100%	2.4	5	3	58%
773	**PI567539**	250	-	1	100%	1.7	3	3	83%
774	**PI567541A**	-	-	0	-	24.2	30	3	92%
775	**PI567541B**	35	18.2	2	25%	9.8	18	3	25%
776	**PI567541C**	200	-	2	100%	26.5	32	3	75%
777	**PI567543A**	1	2.8	4	31%	11.2	16	2	63%
778	**PI567543B**	250	-	4	94%	16.4	22	2	88%
779	**PI567543C**	4	1.0	3	25%	0.0	0	1	25%
780	**PI567545**	31	21.5	3	58%	0.6	1	1	25%
781	**PI567547**	32	31.5	5	100%	5.6	8	3	33%
782	**PI567549A**	132	96.0	2	75%	18.6	30	2	75%
783	**PI567549B**	250	-	4	88%	14.6	22	2	63%
784	**PI567550**	200	-	4	75%	8.5	18	2	63%
785	**PI567558**	109	57.7	2	75%	13.1	16	1	50%
786	**PI567559**	200	101.7	2	75%	13.3	20	3	58%
787	**PI567560**	3	1.2	4	63%	0.0	0	1	50%
788	**PI567563A**	103	46.0	5	80%	12.1	20	3	83%
789	**PI567563B**	21	10.7	3	75%	25.2	35	2	100%
790	**PI567574A**	200	111.2	3	100%	13.1	19	3	100%
791	**PI567574B**	200	-	4	81%	15.7	18	2	88%
792	**PI567576**	300	-	1	75%	16.1	20	3	92%
793	**PI567583A**	250	-	4	94%	27.1	33	1	100%
794	**PI567583B**	250	-	2	88%	11.2	18	3	75%
795	**PI567584**	1	0.3	3	83%	0.0	0	3	25%
796	**PI567585A**	2	1.2	3	25%	5.3	10	3	33%
797	**PI567585B**	200	-	2	88%	4.3	8	1	75%
798	**PI567586A**	200	-	4	94%	24.1	30	3	83%
799	**PI567586B**	200	-	2	75%	12.3	20	3	92%
800	**PI567589**	80	65.7	1	75%	19.3	28	2	100%
801	**PI567590A**	200	-	1	100%	21.9	30	3	100%
802	**PI567592**	10	4.7	4	31%	2.1	6	3	25%
803	**PI567593A**	16	8.0	2	38%	0.1	1	3	25%
804	**PI567594A**	200	175.0	4	94%	17.8	24	2	63%
805	**PI567594B**	120	59.3	2	63%	3.1	6	3	25%
806	**PI567595A**	250	250.0	2	75%	8.8	12	2	100%
807	**PI567595B**	200	33.3	2	75%	10.4	18	3	100%
808	**PI567597A**	112	89.8	3	100%	13.1	22	2	100%
809	**PI567597B**	6	3.7	3	42%	5.9	11	3	25%
810	**PI567597C**	2	0.7	2	25%	0.0	0	2	25%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
811	**PI567598A**	72	58.7	3	100%	4.5	8	2	75%
812	**PI567598B**	3	1.5	3	25%	0.0	0	3	33%
813	**PI567599**	96	71.3	1	25%	7.9	14	3	67%
814	**PI567601**	8	2.7	4	44%	3.0	6	2	25%
815	**PI567602A**	80	59.8	2	75%	15.6	26	2	75%
816	**PI567602B**	100	62.0	2	88%	20.8	28	1	75%
817	**PI567603A**	14	8.8	2	25%	7.7	12	3	50%
818	**PI567607A**	70	62.7	0	-	17.8	30	3	58%
819	**PI567609**	219	168.3	2	88%	9.3	15	2	63%
820	**PI574478A**	139	186.0	3	100%	0.6	5	3	92%
821	**PI574478B**	98	52.3	3	92%	19.6	28	3	67%
822	**PI574478C**	184	129.5	5	100%	13.2	21	3	92%
823	**PI574479A**	144	106.5	2	100%	17.5	24	3	67%
824	**PI574479B**	72	60.0	1	100%	14.6	24	2	50%
825	**PI574480A**	212	143.0	2	100%	15.8	24	3	75%
826	**PI574481**	140	128.2	2	100%	0.0	0	3	25%
827	**PI578368**	82	50.2	2	88%	33.1	56	3	75%
828	**PI578380A**	90	100.7	4	94%	19.0	25	2	88%
829	**PI578382**	56	54.0	3	100%	19.3	32	2	100%
830	**PI578492**	200	85.3	3	92%	24.0	30	3	92%
831	**PI578493**	-	-	0	-	24.8	42	3	100%
832	**PI578498A**	20	10.7	2	38%	6.9	12	3	100%
833	**PI578500**	200	56.3	3	92%	8.1	17	2	100%
834	**PI578502**	2	25.3	2	88%	-	-	0	-
835	**PI578503**	3	51.0	2	100%	10.3	15	3	100%
836	**PI578505**	80	93.7	4	94%	11.3	22	1	75%
837	**PI592921**	161	130.3	4	100%	13.7	21	3	92%
838	**PI592926**	82	94.2	3	100%	12.2	25	3	100%
839	**PI592931**	52	27.3	4	100%	26.0	40	3	33%
840	**PI592932**	125	97.5	5	100%	12.1	15	3	75%
841	**PI592933**	200	166.7	4	94%	16.8	23	3	100%
842	**PI592936**	120	88.0	4	100%	21.9	31	3	100%
843	**PI592941**	93	81.7	3	100%	10.0	18	3	100%
844	**PI592942**	200	-	1	100%	15.0	21	3	100%
845	**PI592943**	194	181.2	4	94%	13.2	17	2	100%
846	**PI592944**	30	39.0	5	100%	9.5	18	3	100%
847	**PI592957**	-	-	0	-	9.0	30	2	100%
848	**PI592958**	120	100.7	1	100%	7.0	16	3	75%
849	**PI592959**	101	82.0	1	100%	11.4	18	2	63%
850	**PI592960**	90	81.5	4	94%	-	-	0	-
851	**PI592967**	-	-	0	-	10.8	18	2	88%
852	**PI592968**	101	49.5	2	100%	11.0	15	1	100%
853	**PI592969**	52	41.7	1	100%	19.0	30	2	88%
854	**PI592970**	90	63.8	3	100%	8.8	22	3	67%
855	**PI592972**	51	24.3	2	100%	-	-	0	-

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
856	**PI592973**	-	-	0	-	17.2	26	1	75%
857	**PI592977**	96	77.0	3	100%	0.3	1	2	25%
858	**PI592978**	-	-	0	-	0.0	0	1	100%
859	**PI592979**	57	55.7	3	100%	4.1	6	1	100%
860	**PI593942**	162	101.3	5	95%	7.0	10	3	100%
861	**PI593943**	17	13.3	1	75%	9.3	22	3	100%
862	**PI593953**	120	104.2	5	100%	0.5	1	3	100%
863	**PI593958**	43	40.5	5	100%	1.5	4	3	100%
864	**PI593959**	130	86.5	5	95%	3.0	6	3	100%
865	**PI593960**	143	108.0	4	94%	10.8	20	3	100%
866	**PI597415**	28	63.5	5	100%	6.4	15	3	67%
867	**PI597419**	105	141.8	5	90%	0.0	0	1	75%
868	**PI597420**	54	70.2	2	100%	15.7	20	1	100%
869	**PI597421**	106	83.2	5	100%	11.1	14	3	50%
870	**PI597427A**	122	98.7	5	100%	6.0	15	3	100%
871	**PI597427B**	141	96.3	5	95%	8.3	16	3	100%
872	**PI597429**	153	107.7	2	100%	9.7	18	3	100%
873	**PI597432**	67	91.5	3	92%	17.3	31	3	100%
874	**PI597439**	167	106.8	5	95%	16.8	38	3	50%
875	**PI597440A**	106	98.7	3	92%	13.8	18	3	83%
876	**PI597440B**	259	224.2	4	100%	11.3	16	3	58%
877	**PI597440C**	82	71.8	5	90%	11.0	21	2	100%
878	**PI597441**	115	99.7	5	100%	3.5	8	2	100%
879	**PI597442**	117	94.8	5	100%	23.6	38	3	67%
880	**PI597443**	126	120.3	5	100%	6.9	12	1	100%
881	**PI597444**	183	147.3	5	100%	2.3	4	2	100%
882	**PI597445**	60	75.2	4	100%	16.7	27	2	100%
883	**PI597446**	69	48.2	4	100%	2.2	10	2	88%
884	**PI597467**	58	66.7	4	100%	17.8	32	3	100%
885	**PI602490**	88	64.3	4	100%	2.4	6	2	100%
886	**PI603293A**	87	85.3	3	100%	-	-	0	-
887	**PI603293B**	133	123.3	3	100%	0.0	0	3	58%
888	**PI603298**	177	120.2	5	95%	12.7	26	2	100%
889	**PI603302**	178	127.3	4	88%	15.9	17	1	100%
890	**PI603303**	194	140.0	3	100%	14.8	24	2	63%
891	**PI603304**	112	89.2	3	92%	14.3	18	3	100%
892	**PI603305**	68	96.0	4	94%	6.3	9	3	100%
893	**PI603307**	158	93.0	3	100%	1.6	8	3	100%
894	**PI603308A**	142	86.0	5	85%	8.8	15	3	100%
895	**PI603308B**	93	95.3	5	90%	9.0	14	3	100%
896	**PI603309**	108	65.0	2	88%	8.8	27	3	100%
897	**PI603310**	42	56.7	4	100%	4.5	9	3	83%
898	**PI603311**	20	70.7	5	95%	16.0	21	3	100%
899	**PI603312**	161	59.2	2	75%	-	-	0	-
900	**PI603315**	10	14.3	5	85%	30.5	41	2	88%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
901	**PI603321**	97	72.5	5	85%	14.0	28	3	83%
902	**PI603323**	38	36.3	5	90%	18.7	23	2	100%
903	**PI603324B**	71	93.3	4	94%	9.7	18	3	92%
904	**PI603325**	128	88.0	4	88%	33.0	41	1	100%
905	**PI603327**	106	98.7	1	100%	16.6	25	2	100%
906	**PI603329**	201	157.3	3	92%	11.1	21	3	100%
907	**PI603330**	180	110.2	3	100%	1.7	3	1	100%
908	**PI603331**	101	55.3	4	94%	14.1	26	2	88%
909	**PI603332**	131	102.8	4	100%	-	-	3	100%
910	**PI603333**	-	-	0	-	11.0	16	2	100%
911	**PI603335B**	106	88.2	3	83%	12.9	18	1	100%
912	**PI603336**	32	48.2	5	100%	6.1	8	1	100%
913	**PI603337A**	35	19.5	5	90%	4.4	12	3	100%
914	**PI603337B**	4	4.2	4	63%	8.3	18	3	100%
915	**PI603338**	111	106.0	5	95%	17.1	23	1	100%
916	**PI603339B**	131	102.8	4	88%	5.0	8	3	67%
917	**PI603340**	112	84.7	4	81%	3.1	6	1	100%
918	**PI603341**	162	139.2	5	100%	6.7	16	3	75%
919	**PI603342**	101	58.8	3	92%	4.2	8	2	63%
920	**PI603343A**	224	150.5	4	75%	6.3	12	3	67%
921	**PI603344**	80	102.8	3	100%	5.3	13	2	75%
922	**PI603345**	90	82.3	1	100%	7.7	12	1	100%
923	**PI603347**	141	108.8	4	94%	16.6	21	2	75%
924	**PI603348A**	170	136.0	1	100%	12.6	23	2	100%
925	**PI603348B**	180	141.8	4	100%	25.3	32	1	100%
926	**PI603348C**	65	59.7	4	94%	9.1	13	3	100%
927	**PI603349**	210	133.0	2	100%	5.3	8	2	100%
928	**PI603350**	60	35.5	3	100%	4.4	6	1	75%
929	**PI603351**	205	101.2	3	92%	3.3	6	3	67%
930	**PI603352**	112	67.3	4	100%	5.6	8	1	100%
931	**PI603353**	171	157.7	1	100%	12.9	28	3	67%
932	**PI603354**	165	100.2	3	100%	23.3	36	2	100%
933	**PI603356**	92	48.7	5	100%	11.5	16	3	100%
934	**PI603357**	139	92.5	4	100%	5.8	12	2	100%
935	**PI603358A**	161	133.0	1	100%	4.7	6	1	100%
936	**PI603358B**	43	31.3	3	92%	11.2	18	3	100%
937	**PI603359**	51	43.5	2	100%	2.9	5	1	50%
938	**PI603360**	141	74.8	3	100%	4.4	18	2	100%
939	**PI603361**	92	76.7	5	90%	9.0	18	1	100%
940	**PI603362**	111	55.8	2	88%	17.8	29	2	100%
941	**PI603363A**	74	37.7	3	92%	20.3	32	3	92%
942	**PI603363B**	62	44.5	3	100%	15.7	20	3	83%
943	**PI603364**	83	62.0	1	100%	4.6	18	2	100%
944	**PI603365**	43	30.5	3	100%	6.6	14	3	83%
945	**PI603367**	92	78.7	3	100%	19.8	35	1	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
946	**PI603368**	140	63.8	4	100%	9.5	16	3	100%
947	**PI603369**	73	59.2	4	94%	10.9	18	3	100%
948	**PI603370**	68	37.3	5	100%	15.8	30	1	100%
949	**PI603371**	36	28.3	1	75%	0.0	0	1	75%
950	**PI603372**	136	109.3	3	100%	22.7	35	2	100%
951	**PI603373**	96	48.0	2	88%	14.2	19	1	100%
952	**PI603374**	144	92.0	4	88%	3.2	8	2	88%
953	**PI603375**	79	57.7	4	100%	19.3	36	3	100%
954	**PI603376**	23	42.2	4	94%	6.3	13	3	100%
955	**PI603377**	15	25.7	5	100%	3.7	8	3	100%
956	**PI603378A**	98	74.0	1	100%	-	-	0	-
957	**PI603378B**	18	23.7	3	100%	7.1	14	3	100%
958	**PI603380**	82	49.0	1	75%	24.8	32	3	92%
959	**PI603381A**	92	64.8	4	94%	3.6	10	3	100%
960	**PI603381B**	102	77.8	4	100%	15.9	26	3	100%
961	**PI603381C**	62	68.2	2	100%	11.3	36	2	100%
962	**PI603382A**	49	36.2	4	100%	17.3	21	1	100%
963	**PI603382B**	33	36.5	4	100%	12.5	20	2	100%
964	**PI603383**	90	65.3	5	100%	9.8	18	3	92%
965	**PI603385**	123	107.2	4	94%	0.1	1	3	100%
966	**PI603386**	98	50.8	5	95%	6.0	12	1	100%
967	**PI603387**	50	58.3	3	100%	14.5	21	3	100%
968	**PI603389**	95	70.8	4	100%	12.5	22	1	75%
969	**PI603390A**	100	102.0	4	100%	17.8	32	3	100%
970	**PI603391**	100	61.8	3	100%	12.4	20	2	100%
971	**PI603398A**	150	90.7	5	95%	7.8	12	2	100%
972	**PI603399**	56	54.7	4	100%	6.3	13	3	92%
973	**PI603403**	131	111.0	5	90%	11.9	26	2	75%
974	**PI603405A**	83	54.5	4	94%	10.0	21	2	75%
975	**PI603412A**	45	36.5	2	88%	13.8	20	3	92%
976	**PI603412B**	18	32.3	3	92%	11.0	21	2	75%
977	**PI603414**	74	83.8	3	92%	26.2	31	1	100%
978	**PI603419A**	72	70.8	3	100%	26.2	42	3	92%
979	**PI603420**	70	73.8	4	94%	13.3	21	3	100%
980	**PI603421A**	90	76.5	5	95%	11.0	20	3	75%
981	**PI603422A**	10	6.7	4	88%	6.8	18	2	88%
982	**PI603425**	43	39.0	5	100%	25.3	32	2	75%
983	**PI603426G**	84	43.0	4	100%	17.1	30	3	100%
984	**PI603428B**	22	12.0	3	92%	3.3	8	3	100%
985	**PI603429D**	31	41.2	3	92%	9.3	18	3	100%
986	**PI603430A**	38	49.7	4	94%	4.1	10	3	100%
987	**PI603433A**	26	28.8	4	100%	5.4	20	3	100%
988	**PI603433B**	222	115.5	3	100%	18.4	30	3	100%
989	**PI603434**	93	88.8	5	100%	13.7	22	3	100%
990	**PI603436A**	210	123.2	3	92%	12.8	20	2	100%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
991	**PI603436B**	149	120.7	5	90%	8.8	30	2	88%
992	**PI603438C**	15	24.3	4	100%	9.4	22	3	100%
993	**PI603438D**	40	60.8	4	88%	7.8	12	2	100%
994	**PI603441**	222	66.3	5	95%	8.1	20	3	75%
995	**PI603443C**	75	51.0	5	85%	5.1	12	2	75%
996	**PI603444A**	124	52.5	3	83%	10.2	19	2	75%
997	**PI603444C**	170	114.0	4	81%	8.4	15	2	100%
998	**PI603446**	156	125.0	5	90%	13.7	20	2	100%
999	**PI603451A**	66	51.7	3	92%	4.3	20	2	100%
1000	**PI603452**	33	48.3	4	88%	9.8	15	3	100%
1001	**PI603454**	68	26.7	4	94%	10.6	16	3	100%
1002	**PI603455A**	17	26.3	5	100%	34.9	45	3	100%
1003	**PI603456**	13	5.3	3	75%	3.1	6	1	100%
1004	**PI603463**	10	7.8	5	95%	12.9	23	3	100%
1005	**PI603464**	42	17.8	3	100%	0.8	2	3	100%
1006	**PI603465A**	101	86.0	4	94%	11.3	15	3	100%
1007	**PI603467**	163	126.3	4	94%	15.7	41	3	100%
1008	**PI603470**	164	121.8	3	92%	0.0	0	1	100%
1009	**PI603471**	164	125.7	3	92%	13.9	26	3	92%
1010	**PI603472A**	21	11.3	3	83%	2.8	6	1	75%
1011	**PI603473**	14	38.0	3	92%	5.6	12	3	67%
1012	**PI603474**	47	37.8	3	83%	9.0	20	3	42%
1013	**PI603475**	43	35.8	5	90%	24.8	35	2	88%
1014	**PI603477A**	56	98.0	1	75%	34.9	45	1	50%
1015	**PI603477B**	165	169.5	3	100%	25.4	56	3	67%
1016	**PI603479**	111	110.8	5	90%	12.2	18	2	88%
1017	**PI603480**	9	16.8	4	94%	21.4	42	3	75%
1018	**PI603481**	104	60.8	3	83%	21.6	38	3	92%
1019	**PI603482**	42	55.3	4	88%	4.9	10	2	63%
1020	**PI603483**	198	139.7	4	88%	15.0	27	3	75%
1021	**PI603484**	135	120.7	4	94%	17.5	30	3	75%
1022	**PI603485**	152	140.8	3	100%	14.0	18	1	75%
1023	**PI603486**	163	151.3	4	88%	19.1	38	3	75%
1024	**PI603488**	127	103.7	2	100%	10.0	18	3	100%
1025	**PI603497**	83	89.3	3	92%	33.5	48	3	75%
1026	**PI603602**	177	100.7	4	88%	39.4	62	2	63%
1027	**PI603612**	35	21.3	3	92%	9.0	13	2	75%
1028	**PI603613**	186	70.2	2	88%	19.0	40	2	75%
1029	**PI612708D**	90	78.8	5	100%	9.9	12	2	88%
1030	**PI612709C**	43	44.2	4	94%	0.0	0	1	50%
1031	**PI612713A**	34	38.0	3	100%	9.2	16	2	63%
1032	**PI612713B**	36	34.7	3	100%	0.0	0	1	75%
1033	**PI612714A**	139	119.5	5	100%	0.5	1	3	67%
1034	**PI612714B**	123	93.7	5	100%	-	-	0	-
1035	**PI612715**	104	89.0	5	100%	18.6	30	2	63%

Entry	PI/ FC number	Replication1				Replication2			
		MAX	MEAN	No. of plants	DI	MAX	MEAN	No. of plants	DI
1036	**PI612716**	97	87.0	5	100%	11.0	15	2	63%
1037	**PI612717**	154	106.0	4	100%	13.3	36	2	63%
1038	**PI612722**	117	114.8	4	94%	14.8	26	3	75%
1039	**PI612723**	149	100.5	2	88%	21.4	32	2	100%
1040	**PI612724A**	65	39.7	5	95%	19.3	26	3	75%
1041	**PI612725**	68	51.5	4	100%	-	-	1	25%
1042	**PI612726**	139	121.3	3	92%	26.0	38	2	88%
1043	**PI 549020**	111	63.5	3	75%	-	-	1	25%
1044	**Resist.chk**	6	3.2	5	55%	0.0	0	1	25%
1045	**Suscep.chk**	128	121.5	3	67%	-			

PI: Plant Introduction, **MG:** Maturity Group, **MAX:** Maximum Number of Aphids per Leaflet
DI: Damaging Index, **Mean:** Average Number of Aphids on Three Leaflets
Resist.chk: Resistant Check, **Suscep.chk:** Susceptible Check