An Appraisal of Aphid Resistant Tuber-Bearing *Solanum* Germ Plasm

E.B. Radcliffe
F.I. Lauer

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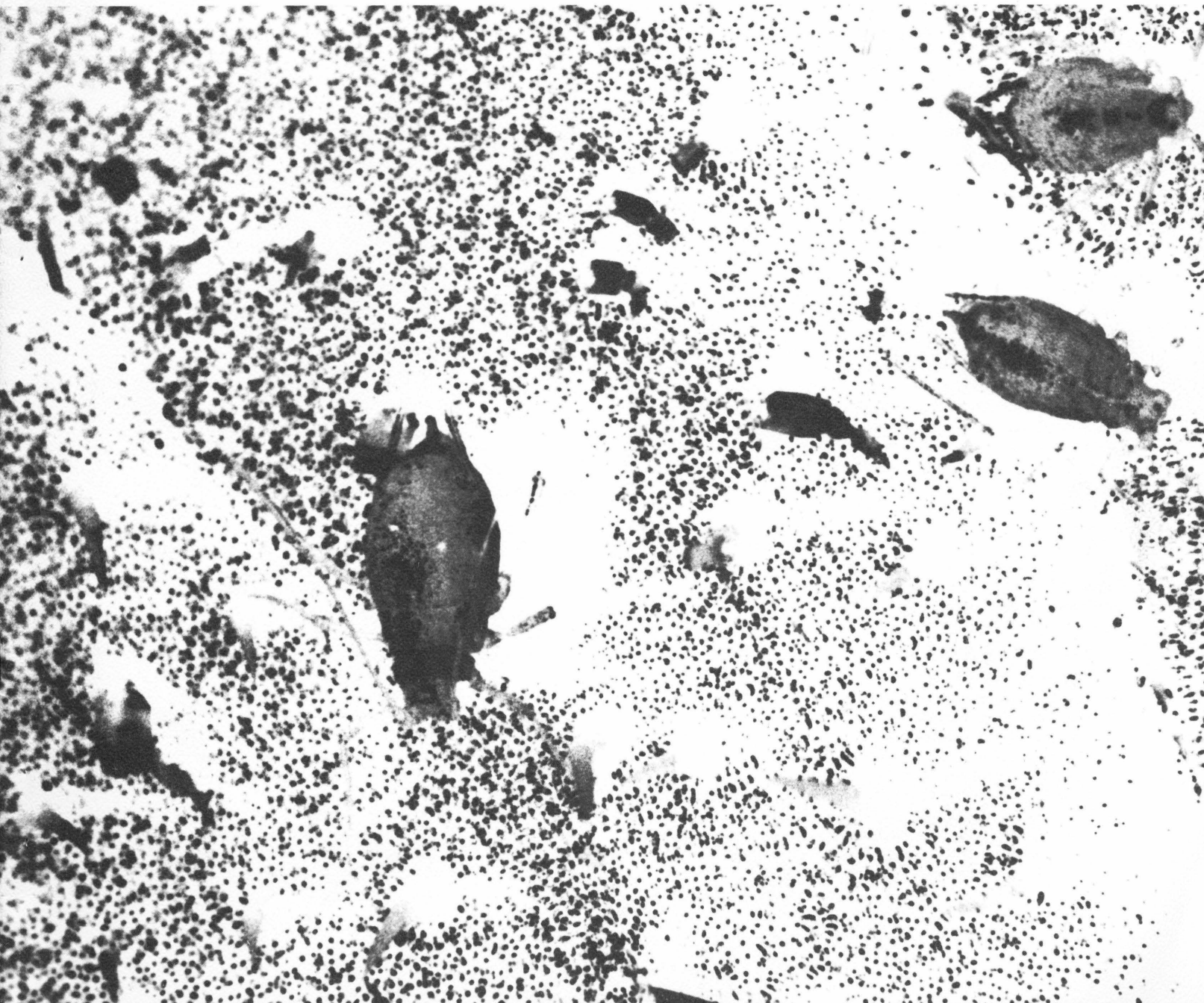

E. B. Radcliffe is an associate professor, Department of Entomology, Fisheries, and Wildlife;
F. I. Lauer is a professor, Department of Horticultural Science.

RESISTANCE TO APHIDS

We have established that wild *Solanum*[1] species differ greatly in susceptibility to infestation by green peach aphid, *Myzus persicae* (Sulzer), and potato aphid, *Macrosiphum euphorbiae* (Thomas), (18-23).[2] From 1965-69, we surveyed 905 introductions representing 83 *Solanum* species or interspecific hybrids as possible sources of aphid resistance (22).

Resistance to green peach aphid and potato aphid is closely, but not invariably, correlated (21,23). Green peach aphid resistance is characteristic of *S. bulbocastanum,* series Bulbocastana; and *S. brachistotrichum,* the closely allied *S. michoacanum* (= *S. trifidium* Corr.), and *S. stenophyllidium,* of the series Pinnatisecta. Other species having appreciable green peach aphid resistance include *S. canasense, cardiophyllum, chomatophilum, hjertingii, megistacrolobum, multidissectum, oxycarpum,* and *sanctae-rosae* (18-23). Potato aphid resistance is characteristic of *S. bulbocastanum; S. hjertingii, polytrichon,* and *stoloniferum,* series Longipedicellata; *S. verrucosum,* series Demissa; and *S. multidissectum,* series Tuberosa. Other species having appreciable potato aphid resistance include *S. canasense, chomatophilum, hougasii, hjertingii, marinasense, oxycarpum,* and *verrucosum* (18-23).

The species listed above have been represented, either by different entries, or in different trials 12 or more times (22). Aphid resistance was also noted in various other introductions, either of *Solanum* species which were typically susceptible, or in species represented infrequently in our experiments (18-23). It is possible one of these introductions may prove a better source of resistance than those species cited above.

Partial resistance can provide significant suppression of insect populations (13,16) because host resistance has both cumulative and persistent effects on pest populations. Addition of partial host resistance could increase environmental resistance sufficiently to preclude a potentially injurious insect from attaining pest status. This has been well documented for several species (16). Luginbill (13) described the development of resistant crop plants as, "The most effective and ideal method of combating insects that attack plants . . ." Moreover, Painter (15) observed that there are more instances of useful plant resistance to aphids than to any other insect group.

POTATO CLASSIFICATION AND BREEDING

Potatoes and certain closely allied species are assigned to section Tuberarium, subsection Hyperbasarthrum of the genus *Solanum* L. Taxonomists' concepts of what constitutes a species within this section have varied with individual and time. Early workers and some contemporary taxonomists have defined species narrowly, with a resulting proliferation of named species. Present concepts of potato species and their serial grouping are largely the result of the research and influence of the English scientist, J.G. Hawkes.

The basic chromosome number of the genus *Solanum* is considered to be 12, 2n = 24 (2,6-8,11,12,23,26). Our cultivated potato, *S. tuberosum* subspecies *tuberosum,* is tetraploid. Every level of ploidy, diploid through hexaploid, occurs in the wild *Solanum* species, but over 70 percent of the species are diploid (26). Each set of 12 chromosomes apparently can pair with any other set of 12 (11,29).

Within given levels of ploidy, tuber-bearing *Solanum* species are highly cross-compatible (26). Most diploid species cross readily with *S. tuberosum* haploids (10), but less readily with tetraploid *S. tuberosum* (10,29). Exceptions to this generalization include species in the series Bulbocastana, Cardiophylla, and Pinnatisecta, which do not hybridize readily with other species (3,26). It is generally difficult to cross tetraploid species of other series with the Tuberosa (7,11,29). For example, *S. canasense, megistacrolobum, multidissectum, sanctae-rosae,* and *verrucosum* hybridize readily with *S. tuberosum* haploids, but hybrids incorporating *S. hjertingii, polytrichon,* or *stoloniferum* and *S. tuberosum* are difficult to accomplish.

In addition to the taxonomic affinities of the species, many other factors are involved in interspecific hybridization: chromosome homology, flower morphology, physiology of the female parent, and environmental requirements (29). New techniques useful in hybridizing species are now available. These include use of haploid parents, colchicine-induced polyploids, embryo culture, and bridging techniques employing intermediate species (3,6,9-12,24,26,29). If satisfactory sources of resistance are located in species of the series X-XII or XV-XVII (table 1), incorporation of this character into *S. tuberosum* parental stock should present no major difficulty.

MATERIALS AND METHODS

Included in the 1970 experiments were 379 entries: 314 introductions selected in previous trials (18-23), 56 introductions not previously evaluated, and nine *S. tuberosum* subspecies *tuberosum* checks. Introductions evaluated in 1970 (table 1) were those which in previous tests (18-23) evidenced resistance to either or both green peach aphid and potato aphid. The most resistant 30 percent of the entries in each previous test were selected for evaluation in 1970. Some of these were no longer available, and a few with inconsistent scores in previous trials were included.

The wild *Solanum* introductions were obtained from the Inter-Regional Potato Collection (IR-1 project), all but seven as true seed. Seedlings were started in the greenhouse April 17. Tubers of the check clones were held in cold storage for direct

[1] Throughout this manuscript, we have followed the conspectus of species names, synonomy, and taxonomic authorship given by J.G. Hawkes, 1963, *A Revision of the Tuber-Bearing Solanums* (Second Edition), Scottish Pl. Breed. Sta. Rec. 76-181. Authors of botanical names are given in table 1.

[2] Numbers in parentheses refer to literature citations on page 5.

planting when the seedlings were transplanted. The potatoes were planted June 15-17, at the North Central School and Experiment Station, Grand Rapids, Minnesota. Material permitting, a randomized complete block design was used with six plants/entry and replicated four times. Plants were spaced at approximate 1-m intervals within and between rows. A cabbage plant infested with green peach aphids was transplanted into every sixth space.

The field was sprayed weekly, July 1-August 24, with carbaryl at 0.75 lb. AI/acre and Difolatan®, cis-N-[(1,1,2,2-tetrachlorethyl) thio]-4-cyclohexene-1,2-dicarboximide, at 1.5 lb. AI/acre. The insecticide eliminated entomophagous enemies of the aphids (17). The fungicide protected the seedlings from early blight, *Alternaria solani* (Ell. & G. Martin) Sor., and late blight, *Phytophthora infestans* (Mont.) de Bary, and suppressed entomogenous fungi (14).

The sampling procedure used in 1970 was essentially that followed in previous years (18,20,21,23). Five plants/entry were sampled/replicate. Each plant was examined 40 seconds. Only apterous aphids were counted.

A severe green peach aphid infestation was obtained in 1970. By September 1, some entries had been killed by the aphids. An exhaustive sampling of a single plant of the variety 'Russet Burbank' yielded over 51,000 green peach aphids. Potato aphid populations, however, remained low throughout the season, perhaps because of competition with green peach aphid. All 379 entries in the experiment were evaluated July 27-30 (table 1). The IR-1 introductions were ranked according to green peach aphid resistance, and 217 of the most resistant were reevaluated August 10-14 (table 1). The nine *S. tuberosum* subspecies *tuberosum* check clones were included in each evaluation.

Data obtained in each of the evaluations were used to compute percentile rankings of resistance to green peach aphid and potato aphid (table 1). The more susceptible introductions and the check clones often had more aphids on a single leaf than could be counted in the allotted time. On the most resistant entries, however, it was often possible to count all of the aphids present. The data were not usually affected by differences in plant size except when the plants were very small. Data on plant height, width, and general vigor were recorded August 24-September 1 (table 1). Counts of less than 60 aphids are assumed to accurately reflect relative resistance. Higher counts give little indication of relative resistance but do indicate susceptibility.

In the successive evaluations of green peach aphid resistance, 21 percent and 56 percent of the entries averaged more than 60 aphids/plant.[3] The maximum number of potato aphids/plant was 15.3. In corresponding evaluations of potato aphid resistance, 72 percent and 79 percent of the entries averaged less than 1 aphid/plant.

RESULTS AND DISCUSSION

Mean numbers of green peach aphids/plant on the nine *S. tuberosum* subspecies *tuberosum* check clones were 60.4 and 98.8, July 27-30 and August 10-12, respectively. Corresponding potato aphid populations on the check clones averaged 0.6 and 1.5. Results of the 1970 experiments (table 1) are presented according to the serial arrangement of *Solanum* species proposed by Hawkes (6). Descriptive comments on the series are derived primarily from Hawkes (6-8). The data are presented by taxonomic group to characterize both species and series and to indicate the affinities of these potential sources of resistant germ plasm to the cultivated potato. The entries included in the 1970 experiments were chosen as possessing resistance (18-23) and are not representative of unselected *Solanum* germ plasm.

SERIES I, JUGLANDIFOLIA. This primarily South American series is included with the true potatoes on the basis of flower structure, but bears no stolons or tubers. *S. ochranthrum,* PI 230508, evidenced resistance to both aphid species and had good plant vigor. There is little probability potato breeders could incorporate characters from this series into *S. tuberosum* parental stock.

SERIES II, ETUBEROSA. Species in this group, as in the preceding series, are diploid, and bear no stolons or tubers. The Etuberosa occur in Chile and Argentina. Green peach aphid resistance is pronounced in *S. brevidens* and *S. etuberosum* introductions. In contrast, *S. fernandezianum,* PI 320270, was severely infested by green peach aphid. Introductions of this series show no evidence of potato aphid resistance. All entries had a vigorous growth habit. Again, it is improbable aphid resistance could be incorporated into the cultivated potato from this series.

SERIES III, MORELLIFORMIA. We have not evaluated any introduction of this Central American series for aphid resistance. There is a single species in this group, *S. morelliforme,* Bitt. & Muench, a small diploid epiphyte growing in dense shade.

SERIES IV, BULBOCASTANA. The Bulbocastana are typically diploid, occasionally triploid, tuber-bearing species indigenous to Mexico and Guatemala. The Bulbocastana are small herbs with simple leaves, and typically upright growth habit. In previous trials (18-23), *S. bulbocastanum* proved resistant to both green peach aphid and potato aphid. Some introductions appear nearly immune to green peach aphid. Greatest green peach aphid resistance in *S. bulbocastanum* was found in PI 255518, PI 275194, PI 275200, WRF 1565, and WRF 1729, each of which, in both first and second evaluations, ranked among the most resistant 5 percent of all introductions tested. Appreciable green peach aphid resistance was noted in most *S. bulbocastanum* introductions, although three were sufficiently infested at the first evaluation to be eliminated from further testing. The two *S. clarum* introductions also have green peach aphid resistance. Both *S. bulbocastanum,* particularly PI 255518 and PI 275197, and *S. clarum* have appreciable potato aphid resistance. Cross-incompatibility makes it improbable that resistance can be transferred from this series to the cultivated potato. Use of an intermediate species as a bridge might permit useful characters of *S. bulbocastanum* to be transferred to a usable parental stock (3,9).

SERIES V, PINNATISECTA. This is a diverse group which some authorities prefer to split. The range of *S. jamesii* is centered in Arizona, New Mexico, and Colorado; the remaining species are Mexican. *S. cardiophyllum* (including *S. ehrenbergii* Bitt.) and *S. jamesii* occur as both diploid and triploid biotypes; the remaining species are exclusively diploid. *S. cardiophyllum, michoacanum, pinnatisectum,* and *S.* X *sambucinum* (a natural hybrid, *S. pinnatisectum* X *cardiophyllum*), occur as weeds in cultivated crops. Again, incompatibility of this series with Tuberosa is a major obstacle in

[3] The term aphids/plant is used in this text as the mean number of aphids counted/plant in 40 seconds.

using these species for improvement of the cultivated potato. Bridging by *S. acaule* may permit the transfer of desirable characters (3,7,9). We consistently found green peach aphid resistance characteristic of this group (18-23), particularly *S. brachistotrichum, michoacanum,* and *stenophyllidium.* Other species of this series proved more variable in green peach aphid resistance (19,22); *S.* X *sambucinum* and *S. pinnatisectum* proved relatively susceptible. This was true of the introductions tested in 1970. Some *S. cardiophyllum* introductions have appreciable green peach aphid resistance. The low score for PI 255520, however, was based on a single small plant. Previous data on this entry have been inconsistent. No species of this series evidences much potato aphid resistance and *S. michoacanum* is decidedly susceptible.

SERIES VI, COMMERSONIANA. Species of this series are indigenous to South America. All are typically diploid, although autotriploids occur. Commersoniana has superficial similarities with Pinnatisecta, and some authorities regard it as closely allied to that group (2,8). *S. chacoense* and *S. tarijense* are closer to Tuberosa than are other species of Commersoniana (7). *S. chacoense* has been intensively investigated as a source of resistance to Colorado potato beetle, *Leptinotarsa decemlineata* (Say), (8,12,24,30). Ross (24) reported that European potato selections incorporating *S. chacoense* were approaching varietal level. Adams (1) demonstrated green peach aphid resistance in *S. chacoense* and *S. commersonii.* In contrast, we found introductions of these species typically susceptible (18,19,22). The few introductions of *S. chacoense* and *commersonii* which survived previous screening (18-23) were relatively susceptible to both aphid species in 1970 experiments. *S. commersonii* appears more resistant than either *S. chacoense* or *S. tarijense.*

SERIES VII, CIRCAEIFOLIA. The Circaeifolia are indigenous to the high mountain cloud forests of northern Bolivia. The two known species, *S. capsicibaccatum* and *S. circaeifolium* Bitt. are both diploid. *S. capsicibaccatum,* PI 205560, is the only representative of this series we have evaluated. That introduction has appreciable resistance to green peach aphid, but is susceptible to potato aphid.

SERIES VIII, CONICIBACCATA. This is the only series indigenous to both North and South America (7). The species are diverse and the taxonomy is likely to undergo substantial revision. Diploid, tetraploid, and hexaploid species occur (7). In previous trials (18-23), species of this series showed little evidence of resistance to either aphid species. Low aphid counts are typical for introductions of *S. oxycarpum,* but may reflect the small size of these plants. *S. laxissimum,* PI 283088, was scored as resistant to green peach aphid in 1969 (23), but was severely infested in 1970.

SERIES IX, PIURANA. This is another diverse group requiring further taxonomic study. The Piurana are distributed from Colombia to Peru. Diploid and tetraploid species are known. The species seem to intergrade from the Conicibaccata to the Tuberosa (7). The various *S. chomatophilum* introductions and *S. tuquerrense,* PI 338614, have appreciable green peach aphid resistance. With the possible exception of *S. chomatophilum,* PI 243340, species of this series proved relatively susceptible to potato aphid infestation.

SERIES X, ACAULIA. *S. acaule* is the only species in this series, but distinct subspecies occur. *S. acaule* is found at very high altitudes from Peru to northwestern Argentina. The subspecies are either tetraploid or hexaploid. *S. acaule* hybridizes with species in the series Commersoniana, Demissa, Longipedicellata, Cuneoalata, Megistacroloba, and Tuberosa (8). Moreover, Dionne (3) has described a technique of using *S. acaule* as a bridge between the Mexican series, Bulbocastana, Cardiophylla, and Pinnatisecta, and the series Tuberosa. *S. acaule* has been studied as a possible source of frost resistance (8). Adams (1) reported *S. acaule* resistant to green peach aphid, but in our trials, it was susceptible and only intermediate in potato aphid resistance (18,19,22). The 1970 data were consistent with our earlier evaluations. As a source of aphid resistance, *S. acaule* appears of little promise, although a few introductions sustained relatively low potato aphid populations.

SERIES XI, DEMISSA. This series encompasses a heterogeneous grouping of species that taxonomists may eventually split into several series. The Demissa are found in high mountain forests of south-central Mexico. With the exception of *S. verrucosum,* a diploid species apparently not closely allied to other Demissa, species of this series are either pentaploid or hexaploid. Some authorities regard *S. verrucosum* as belonging to the Tuberosa, or at least representing a link between the groups (8). *S. demissum* has attracted attention as a possible source of resistance to larval feeding by the Colorado potato beetle (24), but this resistance is not retained in back crosses (30). Many European varieties bear *S. demissum* genes (24,30). Our 1970 data were consistent with previous studies (18-23) demonstrating little green peach aphid resistance in species of this series. Moderate potato aphid resistance was noted in all species. For example, certain introductions of *S. hougasii, iopetalum,* and *verrucosum* had low potato aphid scores.

SERIES XII, LONGIPEDICELLATA. Species of this series are found on dry plateaux and medium altitude mountain slopes of central Mexico and the southwestern United States. *S. vallis-mexici* Juz., a natural hybrid of *S. stoloniferum* X *verrucosum,* is the only triploid of this series; remaining species are tetraploids (6). *S. polytrichon* is highly resistant to potato leafhopper, *Empoasca fabae* (Harris), (19,20). *S. stoloniferum* has immunity to viruses A and Y (24) and resistance to late blight (24) and the potato flea beetle, *Epitrix cucumeris* (Harris), (5,25,28). *S. stoloniferum* has been used in European potato breeding programs; selections incorporating *S. stoloniferum* are at the varietal level (24). Longipedicellata offers promising sources of potato aphid resistance (18-23). Various introductions of the several species are highly resistant to green peach aphid (18-23). Greatest green peach aphid resistance in the series was noted in *S. polytrichon,* PI 184773; and *S. stoloniferum,* PI 195167, PI 195195, PI 255532, and PI 275248. Identification of particular introductions as sources of potato aphid resistance on the basis of 1970 data is of questionable merit, because the low populations of this aphid provided little selective pressure. The introductions sustaining the fewest potato aphids, however, were *S. polytrichon,* PI 184770; *S. stoloniferum,* PI 195195, PI 275249, and PI 338621. *S. stoloniferum* appears promising as a possible source of resistance to both green peach aphid and potato aphid. Because it is a highly variable or collective species (2), an intensive survey should be undertaken to identify the most desirable introductions.

SERIES XIII, POLYADENIA. The Polyadenia consist of *S. polyadenium* and the recently discovered *S. lesteri* Hawkes & Hjerting. Both species are Mexican diploids. Polyadenia appears to provide an evolutionary link between the Mexican

diploid series Bulbocastana and Pinnatisecta, and (i) the Mexican polyploid series Longipedicellata, Demissa, and Conicibaccata and (ii) the South American series (7). But this is not the only reason for plant breeders' interest in this species; *S. polyadenium* is highly resistant or immune to both potato leafhopper (19,20,25,28) and potato flea beetle (5,25,28). Adams (1) reported *S. polyadenium* immune to green peach aphid. Introductions we evaluated typically proved moderately to highly susceptible (18-23). The two introductions evaluated in 1970, PI 310963 and PI 320342, however, were relatively resistant to green peach aphid. It must be concluded that *S. polyadenium* is highly variable for this character.

SERIES XIV, CUNEOALATA. The only species in this series, *S. infundibuliforme,* occurs at high altitudes from southern Bolivia into Chile and Argentina. *S. infundibuliforme* is a diploid species, assumed closely allied to the Megistacroloba (7,8). The plants are small and often straggly. The resistance of *S. infundibuliforme* to both green peach aphid and potato aphid appears of an intermediate level.

SERIES XV, MEGISTACROLOBA. Species of this exclusively diploid series are found from northern Peru to northwestern Argentina. Possibly the Megistacroloba shared a common ancestry with the Acaulia. Within this series, *S. sanctae-rosae* appears to have the greatest promise as a source of aphid resistance (19-22). In 1970, four *S. sanctae-rosae* introductions, PI 205397, PI 218221, PI 230464, and PI 275152, were highly resistant to green peach aphid.

SERIES XVI, INGAEFOLIA. The Ingaefolia consists of two little known species endemic to mountains of northern Peru. Neither species has been represented in our experiments.

SERIES XVII, TUBEROSA. Hawkes (6) listed 57 wild and seven cultivated species in this series. Various authorities divide the Tuberosa into a number of series. Until further research reveals the affinities of the various species, it is probably advisable to consider them, as Hawkes has, as a single series. Tuberosa are found from Venezuela to northwestern Argentina and Chile as far as 45° south. All cultivated potatoes are of the series Tuberosa. All levels of ploidy, diploid through pentaploid, occur in native cultivated potatoes (2,4,8,12,31). Most important of the native varieties are the tetraploid groups, Tuberosum and Andigena, which some authorities regard as being a single species, *S. tuberosum* (2,31). Principal distinction between these groups is their day length requirements for tuberization (2,4,12,27,28,31). The potato of commercial agriculture appears to have originated from a short day Andean type, and not as once supposed, the long day introductions from Chiloé or the adjacent mainland of Chile (4,8,12,27,29,31). The diploid 'species' *S. phureja,* and *S. stenotomum,* and the triploid *S. chauca* Juz. & Buk. are also regarded by some authorities as groups within the species *S. tuberosum* (2,4,31).

In our previous research (18-23), 37 species of Tuberosa have been evaluated, including more than 200 *S. tuberosum* subspecies *andigena* introductions. These wild introductions proved less susceptible to both green peach aphid and potato aphid than the check cultivars, but few appear to offer promise as possible sources of aphid resistance (18-23). Most *S. tuberosum* subspecies *andigena* surviving previous screening for evaluation in 1970 are presumed to have escaped due to low selective pressure when first evaluated, particularly in 1965 and 1966 (18,20). While the *S. tuberosum* subspecies *andigena* introductions surveyed have not provided sources of resistance, other species of Tuberosa are more interesting. Certain introductions of *S. andreanum, bukasovii, canasense, marinasense,* and *multidissectum* are characterized by resistance to both aphid species (22). *S. leptophyes, lignicaule,* and *soukupii* were identified (22) as resistant to green peach aphid, and *S. gandarillasii* as resistant to potato aphid (22). In 1970, *S. canasense,* for example, PI 265863 and PI 283074, was the Tuberosa species showing greatest green aphid resistance. Green peach aphid resistance in *S. canasense* introductions varied considerably, and most appeared highly susceptible to potato aphid. *S. andreanum,* WRF 1144, had low counts of both aphids, but this observation was based on a single plant. Conversely, *S. gandarillasii,* PI 265866, and *S. pampasense,* WRF 1576, were relatively resistant to potato aphid, but highly susceptible to green peach aphid. Moderate green peach aphid resistance was characteristic of some *S. marinasense* introductions, for example, PI 310945 and WRF 1533; and *S. multidissectum,* PI 210052 and PI 275271. One introduction of *S. spegazzinii,* PI 208876, a very large vigorous selection, evidenced green peach aphid resistance that looked better in the field than the counts suggest. A few introductions of cultivated species evidenced sufficient resistance to warrant further evaluation, for example, *S. stenotomum,* PI 195188; and *S. tuberosum* subspecies *andigena,* PI 237208 and PI 245317.

UNIDENTIFIED INTRODUCTIONS. The 1970 experiments included 17 introductions which were supplied without species identification or IR-1 designations. Most of these introductions were highly susceptible, but those designated Och S-6, Och S-15, Och S-33, and Och S-68 had moderate green peach aphid resistance.

SUMMARY

In previous studies, 1965-9, we surveyed an extensive and representative sampling of the wild tuber-bearing *Solanum* species as possible sources of resistance to green peach aphid and potato aphid (18-23). Those introductions which, in the preliminary studies, evidenced resistance to either aphid species were reevaluated in 1970. The 1970 experiments (table 1) provided an exceptionally severe test of green peach aphid resistance and an indication of possible potato aphid resistance. The range of resistance, both to green peach aphid and to potato aphid, is of considerable magnitude between and within species. Aphid resistance has been identified in a wide range of species and series of both Central and South American origin. Some resistant introductions are of species essentially incompatible with *S. tuberosum* and, therefore, of little interest to potato breeders. Using modern crossing techniques to circumvent interspecific cross-incompatibility (3,6,9-12,24,26,29), *S. tuberosum* can be readily hybridized with many of the aphid resistant introductions. The challenge to potato breeders is to accomplish incorporation of these characters into parental material.

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After preparing the final draft of this manuscript, we were advised (personal communication from Roman Ross, Potato Introduction Station, Sturgeon Bay, Wis.) that permanent PI numbers have been assigned the Ochoa materials. In this manuscript, these introductions are identified by the prefix Och. Listed below, in sequence of citation (table 1), permanent identifications and certain additional information follow the temporary Ochoa designations in parentheses.

Series IX, Piurana: *S. chomatophilum,* Och S-35 (PI 365324), Och S-42 (PI 365325), Och S-43 (PI 365326), Och S-71 (PI 365327), Och S-73 (PI 365328); *S. huancabambense,* Och O21xO24 (PI 365406); *S. pascoense,* Och S-76 (PI 365339).

Series X, Acaulia: *S. acaule,* Och S-17 (PI 365305), Och S-21 (PI 365306), Och S-39 (PI 365307), Och S-74 (PI 365310), Och S-83 (PI 365312).

Series XV, Megistacroloba: *S. raphanifolium,* Och S-58 (PI 365342).

Series XVII, Tuberosa (wild species): *S. acroscopicum,* Och S-81 (PI 365314), Och S-86 (PI 365315); *S. ambosinum,* Och S-47 (PI 365316), Och S-61 (PI 365317); *S. bukasovii,* Och S-28 (PI 365318); *S. canasense,* Och S-12 (PI 365320), Och S-24 (PI 365321); *S. mochicense,* Och S-20 (PI 365334); *S. multidissectum,* Och S-9 (PI 365335); *S. multiinterruptum,* Och S-27 (PI 365336), Och S-85 (PI 365338); *S. sparsipilum,* Och SC-95 (PI 365343). Tuberosa (cultivated species): *S. phureja,* Och SC-105 (PI 365341); *S. stenotomum,* Och S-46 (PI 365344); *S. tuberosum* subspecies *andigena,* Och SC-100 (PI 365345), Och SC-103 (PI 365346).

Miscellaneous unidentified: Och S-5 (PI 365348), Och S-6 (PI 365349), Och S-7 (PI 365350), Och S-11 (PI 365351), Och S-15 (PI 365352, species complex of *S. canasense-abbottianum* Juz.-*bukasovii*); Och S-33 (PI 365355, species complex of *S. canasense-multiinterruptum*), Och S-34 (PI 365356), Och S-38 (PI 365357), Och S-54 (PI 365360), Och S-60 (PI 365363, undescribed species), Och S-62 (PI 365364), Och S-63 (PI 365365), Och S-64 (PI 365366), Och S-65 (PI 365367), Och S-68 (PI 365368, undescribed species), Och S-77 (PI 365319, *S. bukasovii*).

Table 1. Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
	Series I, Juglandifolia Rydb.					
S. ochranthum Dun.						
PI 230508	9[b]	60[b]	1[b]	10[b]	25x40	4.0
	Series II, Etuberosa Juz.					
S. brevidens Phil						
PI 245764	14[b]	15[b]	91[b]	73[b]	31x58	5.0
S. etuberosum Lindl.						
PI 245924	2	10	94	85	25x51	4.8
PI 245939	2	7	45	90	26x56	4.8
S. fernandezianum Phil.						
PI 320270	86[b]	-	64[b]	-	14x25	4.0
	Series III, Morelliformia Hawkes					
	Series IV, Bulbocastana Rydb.					
S. bulbocastanum Dun.						
PI 243345	51	80	20	69	25x19	2.4
PI 243504	43	67	74	79	25x21	3.4
PI 243506	28	39	38	39	27x26	2.4
PI 243507	41	83	69	62	30x25	2.2
PI 243508	20	25	75	4	22x18	2.3
PI 243509	24	45	30	53	24x23	2.1
PI 243511	79	-	31	-	30x24	2.0
PI 243512	30[b]	40[b]	5[b]	67[b]	28x26	2.7
PI 243513	36	42	7	36	25x28	2.6
PI 255516	11[b]	6[b]	2[b]	2[b]	22x24	3.2
PI 255518	3[b]	1[b]	1[b]	1[b]	20x24	2.0
PI 275184	55	63	66	26	27x24	2.8

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] — Percentile rank, 1 = resistant — Green peach aphid 7/27-30	Green peach aphid 8/10-12	Potato aphid 7/27-30	Potato aphid 8/10-12	Plant characteristics — Height x width (cm) 8/24-9/1	Vigor 1-5 5 = good 8/24-9/1
PI 275185	50	72	15	62	27x22	2.9
PI 275187	85[b]	-	78[b]	-	28x22	2.5
PI 275188	12	17	2	18	23x26	2.2
PI 275189	6	13	19	24	26x29	2.3
PI 275193	38	28	45	6	19x23	2.5
PI 275194	2	2	19	26	22x25	2.6
PI 275195	18	12	3	20	24x29	2.4
PI 275196	20	42	18	40	25x32	2.8
PI 275197	16	4	3	1	22x19	2.3
PI 275198	34	53	25	9	21x30	2.4
PI 275199	50	70	16	40	28x31	1.6
PI 275200	1[b]	3[b]	60[b]	32[b]	21x22	1.9
WRF 1565	3	4	45	63	25x34	2.5
WRF 1729	1[b]	1[b]	28[b]	1[b]	14x21	2.7
S. clarum Corr.						
PI 243355	28[b]	15[b]	4[b]	33[b]	19x21	2.0
PI 275202	25[b]	23[b]	7[b]	4[b]	15x20	2.3
Series V, Pinnatisecta Rydb.						
S. brachistotrichum (Bitt.) Rydb.						
PI 283095	20[b]	13[b]	94[b]	72[b]	11x17	3.8
PI 320265	4[b]	1[b]	1[b]	98[b]	15x17	2.4
WRF 1271	1[b]	3[b]	22[b]	77[b]	15x19	2.3
S. cardiophyllum Lindl.						
PI 184762	24[b]	33[b]	86[b]	96[b]	14x25	2.0
PI 186548	4[b]	49[b]	28[b]	8[b]	13x23	1.8
PI 255519	75[b]	-	24[b]	-	8x14	1.9

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
PI 255520	1[b]	1[b]	1[b]	1[b]	13x17	2.0
PI 275212	40	31	66	97	17x26	3.1
PI 275213	2[b]	39[b]	93[b]	81[b]	12x17	2.5
PI 275214	15	11[b]	70	92[b]	16x23	2.5
PI 275215	35	58	6	36	43x53	3.6
PI 275216	26	32	75	77	19x28	2.3
PI 279272	14[b]	54[b]	68[b]	59[b]	30x32	2.9
PI 283063	43[b]	60[b]	86[b]	97[b]	26x30	3.2
WRF 276	34	90	58	80	18x34	3.0
WRF 1274	60[b]	-	87[b]	-	22x33	2.6
WRF 1733	77	-	60	-	23x35	2.4
S. jamesii Torr.						
PI 195190	8[b]	18[b]	79[b]	85[b]	25x49	3.2
PI 275170	17	34	90	75	31x53	4.3
S. michoacanum (Bitt.) Rydb.						
PI 255536	23[b]	16[b]	72[b]	55[b]	23x28	2.5
PI 255537	5[b]	11[b]	31[b]	65[b]	19x22	3.4
PI 255538	15[b]	16[b]	100[b]	100[b]	29x35	2.6
PI 255539	26	43	35	93	31x36	3.6
PI 255540	3[b]	5[b]	96[b]	92[b]	23x29	2.9
PI 255541	12	29[b]	85	78[b]	31x40	3.6
PI 255542	7	14	34	53	29x35	2.7
PI 283064	19[b]	47[b]	77[b]	47[b]	19x29	3.7
S. pinnatisectum Dun.						
PI 275236	63	94	52	57	25x41	2.8
S.x sambucinum Rydb.						
WRF 1580	92[b]	-	73[b]	-	29x39	2.8

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
S. stenophyllidium Bitt.						
PI 255527	10[b]	50[b]	93[b]	89[b]	11x20	3.7
PI 255528	1[b]	14[b]	1[b]	45[b]	16x17	3.0
PI 255529	28[b]	8[b]	5[b]	3[b]	8x13	1.3
PI 255530	20	43[b]	82	96[b]	13x21	2.2
Series VI, Commersoniana Buk.						
S. chacoense Bitt.						
PI 133619	83[b]	-	63[b]	-	39x85	3.0
PI 320287	95	-	85	-	36x62	2.3
PI 320288	81	-	91	-	37x65	4.2
PI 320289	93[b]	-	95[b]	-	42x79	3.0
S. commersonii Dun.						
PI 320266	32	55	20	76	18x34	2.3
PI 320267	64	-	37	-	14x23	2.7
PI 320269	45	82	51	64	17x50	4.0
S. tarijense Hawkes						
PI 265577	71	-	85	-	35x60	3.4
Series VII, Circaeifolia Hawkes						
S. capsicibaccatum Cárd.						
PI 205560	1	2	70	91	19x22	2.3
Series VIII, Conicibaccata Bitt.						
S. colombianum Dun.						
PI 310983	98[b]	-	67[b]	-	12x13	1.5
PI 320346	79[b]	-	13[b]	-	2x7	1.0
S. moscopanum Hawkes						
PI 230462	46[b]	70[b]	10[b]	27[b]	14x23	3.5

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] — Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
S. oxycarpum Schiede						
PI 186568	22[b]	38[b]	26[b]	7[b]	7x10	2.9
PI 230479	56[b]	14[b]	11[b]	3[b]	2x7	1.0
PI 275224	87[b]	-	29[b]	-	11x26	2.0
S. laxissimum Bitt.						
PI 283088	97[b]	-	97[b]	-	10x20	1.6
	Series IX, Piurana Hawkes					
S. chancayense Ochoa						
PI 338615	84[b]	-	36[b]	-	18x23	2.0
S. chomatophilum Bitt.						
PI 243340	7[b]	6[b]	1[b]	2[b]	10x27	2.0
PI 266387	5	10	52	72	17x21	1.5
PI 310943	16[b]	32[b]	68[b]	65[b]	15x23	2.0
PI 310990	19	28	36	24	16x24	1.9
PI 310991	13	40	49	81	17x29	2.1
Och S-35	11	38	40	32	11x14	2.4
Och S-42	1[b]	3[b]	1[b]	82[b]	4x9	4.0
Och S-43	7	8	33	42	15x25	2.8
Och S-71	48	56	19	51	18x27	2.2
Och S-73	43[b]	61[b]	56[b]	59[b]	15x19	1.6
S. tuquerrense Hawkes						
PI 338614	3	25	25	38	14x25	3.8
S. huancabambense Ochoa						
Och 021x024	85	-	18	-	27x46	2.2
S. pascoense Ochoa						
Och S-76	33[b]	89[b]	72[b]	14[b]	23x35	4.0

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] — Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
	Series X, Acaulia Juz.					
S. acaule Bitt.						
PI 175395	55	57	78	17	16x34	1.5
PI 230494	70	-	12	-	13x32	1.6
PI 230529	65	-	43	-	15x33	1.1
PI 230530	90	-	50	-	14x32	1.1
PI 266381	53	75	21	28	14x35	1.6
PI 275127	44	95	47	18	18x33	1.0
PI 275129	80	-	48	-	18x39	2.6
Och S-17	80	-	33	-	8x27	1.5
Och S-21	89	-	28	-	10x28	1.7
Och S-39	91	-	81	-	16x34	2.0
Och S-74	87	-	30	-	8x23	1.8
Och S-83	97	-	14	-	11x30	1.7
	Series XI, Demissa Buk.					
S. brachycarpum Corr.						
PI 243344	80[b]	-	50[b]	-	12x12	1.0
PI 275183	92	-	13	-	16x26	1.7
S. demissum Lindl.						
PI 160208	71	-	63	-	23x39	1.3
PI 160222	88	-	51	-	28x44	1.8
PI 160229	76	-	27	-	21x44	1.3
PI 161155	22	72[b]	20	43[b]	7x23	1.5
PI 161164	94	-	52	-	23x37	2.1
PI 161167	88	-	36	-	23x42	1.2
PI 161719	85	-	60	-	21x32	1.4
PI 218047	40	89	23	46	20x42	1.9

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
PI 230589	45	53	9	19	15x26	1.6
PI 230591	65	-	49	-	16x33	2.3
PI 230592	56[b]	27[b]	10[b]	5[b]	27x42	2.5
PI 275211	70	-	93	-	18x38	3.1
PI 310962	90	-	54	-	28x55	1.7
S. hougasii Corr.						
PI 161174	56	82	11	22	31x52	2.1
PI 161726	81	-	41	-	22x25	1.8
WRF 1569	74	96	67	28	32x51	1.8
WRF 1736	93	-	42	-	36x59	2.0
S. iopetalum (Bitt.) Hawkes						
PI 275181	63	73	35	12	13x21	2.3
PI 275182	76	-	12	-	12x22	2.7
S. verrucosum Schlechtd.						
PI 160228	42	86	9	14	29x34	2.3
PI 195171	57	93	17	37	29x51	2.9
PI 195172	47	94	35	27	30x43	2.8
PI 251756	69[b]	-	59[b]	-	24x27	1.7
PI 255544	91	-	62	-	15x19	1.1
PI 275254	49[b]	57[b]	10[b]	25[b]	26x40	4.5
PI 275255	50	88	32	35	21x27	1.9
PI 275256	32	68	36	39	23x34	1.8
PI 275258	59	-	38	-	24x33	1.6
PI 275259	57	-	46	-	19x22	1.5
PI 275260	84	-	62	-	30x48	2.2
PI 310966	46	91	10	14	26x31	1.9
PI 320344	43	93	50	15	24x35	1.5

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
PI 338624	53	90	42	49	28x38	1.8
Series XII, Longipedicellata Buk.						
S. fendleri A. Gray						
PI 251062	60[b]	-	29[b]	-	27x43	2.0
PI 255543	60	-	27	-	25x40	2.0
PI 275160	26[b]	99[b]	4[b]	87[b]	27x42	2.0
S. hjertingii Hawkes						
PI 186559	45	79	41	22	27x43	3.4
PI 186560	24	66	22	34	20x24	3.4
PI 251063	47	59	15	20	32x40	3.9
PI 251065	48	-	30	-	30x38	2.6
PI 251067	31	77	26	67	30x41	3.9
PI 275174	37	69	23	23	32x41	3.1
PI 283103	31	57	55	22	22x28	3.8
S. papita Rydb.						
PI 262895	29	67	27	60	27x40	2.6
PI 283105	75	-	25	-	31x51	2.5
S. polytrichon Rydb.						
PI 184770	32	64	5	11	30x45	2.9
PI 184773	4	24	22	53	31x45	3.1
PI 255545	72	-	38	-	33x56	3.2
PI 255547	57	-	64	-	35x57	2.8
PI 275240	51	81	68	13	23x41	2.9
PI 275241	74	-	12	-	24x38	2.4
S. stoloniferum Schlechtd. & Bché.						
PI 160224	44	71	34	35	30x43	2.6
PI 160226	14	47	14	50	38x50	2.6

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
PI 161171	25	41	46	48	38x58	4.2
PI 161172	42	50	15	16	39x48	2.8
PI 161178	27	58	15	10	41x56	3.7
PI 161364	32	88	6	60	40x45	3.4
PI 186563	15	36	87	21	35x46	3.0
PI 195166	41	64	23	31	42x58	3.1
PI 195167	21	19	34	31	32x46	1.8
PI 195195	10[b]	21[b]	2[b]	3[b]	33x49	3.3
PI 201849	31	65	21	48	30x49	2.7
PI 201855	19	30	26	6	44x61	3.5
PI 205522	26	52	4	17	36x57	2.3
PI 225661	37	68	30	21	30x40	1.7
PI 255525	54	75	16	29	41x55	2.5
PI 255532	5	20	89	99	37x53	3.3
PI 255534	28	53	60	61	25x40	3.1
PI 255548	48	87	62	19	29x44	3.0
PI 275245	38	82	81	85	47x62	3.2
PI 275246	30	34	5	41	48x61	3.5
PI 275247	52	78	37	30	36x58	3.5
PI 275248	6	24	44	56	38x46	2.5
PI 275249	18	46	3	7	37x47	2.6
PI 275250	40	91	83	47	21x31	1.8
PI 275252	53	92	83	74	41x61	1.7
PI 283109	68	-	45	-	36x48	3.5
PI 310964	25	32	27	23	34x49	2.9
PI 310980	12	50	16	16	38x56	3.7
PI 320343	90	-	76	-	38x51	2.4

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
PI 338621	39	81	8	12	41x57	2.3
Series XIII, Polyadenia Buk.						
S. polyadenium Greenm.						
PI 310963	12	23	66	86	32x34	2.6
PI 320342	27	17	38	84	31x41	2.7
Series XIV, Cuneoalata Hawkes						
S. infundibuliforme Phil.						
PI 275146	35[b]	22[b]	6[b]	46[b]	14x26	2.0
PI 283077	41[b]	63[b]	83[b]	88[b]	20x36	2.9
PI 310976	33	71	89	95	22x38	2.9
PI 320295	78	-	92	-	24x41	2.9
Series XV, Megistacroloba Cárd. and Hawkes						
S. boliviense Dun.						
PI 310928	73	-	79	-	17x36	1.8
WRF 1561	95[b]	-	94[b]	-	20x58	1.5
S. megistacrolobum Bitt.						
PI 233125	30	17	91	86	14x27	2.2
PI 265578	72	-	57	-	19x38	2.3
PI 265874	67	-	99	-	13x28	2.1
PI 265879	49[b]	41[b]	87[b]	83[b]	13x25	2.4
PI 310978	66	-	77	-	16x28	1.4
PI 320303	59	-	87	-	21x39	2.4
S. raphanifolium Cárd. & Hawkes						
PI 210048	93	-	95	-	21x40	1.4
PI 265878	87	-	70	-	27x49	1.7
Och S-58	75[b]	-	63[b]	-	24x40	3.0

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
S. sanctae-rosae Hawkes						
PI 205397	9[b]	7[b]	81[b]	98[b]	22x42	2.3
PI 218221	8	20	71	91	21x41	2.2
PI 230464	9	10	88	89	19x43	2.7
PI 275152	11[b]	9[b]	53[b]	94[b]	15x29	1.7
PI 283089	25	46	92	78	20x43	3.3
PI 320323	77[b]	-	82[b]	-	32x48	2.8
PI 320324	47	48	88	78	21x44	2.4
PI 320325	35[b]	25[b]	93[b]	89[b]	19x38	3.0
S. sogarandinum Ochoa						
PI 230510	70	-	18	-	19x28	2.1
Series XVI, Ingaefolia Ochoa						
Series XVII, Tuberosa Rydb. (wild species)						
S. acroscopicum Ochoa						
Och S-81	97	-	97	-	15x17	1.3
Och S-86	66[b]	-	97[b]	-	21x25	1.0
S. ambosinum Ochoa						
Och S-47	51	67	17	45	20x34	2.6
Och S-61	52	-	47	-	22x40	2.0
S. andreanum Baker						
WRF 1144	36[b]	-	7[b]	-		
S. x berthaultii Hawkes						
PI 265858	30	21	81	58	41x66	4.0
S. bukasovii Juz.						
Och S-28	67	-	41	-	20x52	3.3
S. canasense Hawkes						
PI 210035	10	18	31	57	20x38	2.6

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
PI 230511	29	87	59	80	24x38	2.0
PI 246533	6	21	56	76	23x42	2.2
PI 265863	8	9	42	29	28x41	2.6
PI 265864	16	51	3	38	23x46	1.9
PI 265875	27	75	72	64	27x52	1.9
PI 283073	33	56	48	10	21x42	2.1
PI 283074	8	7[b]	83	88[b]	23x26	2.1
PI 283084	21	69	53	75	25x39	3.2
PI 310937	25	37	35	57	21x36	2.3
PI 310938	39	44	47	52	18x31	2.3
PI 310939	22	59	20	83	25x48	2.2
PI 310940	13	31	55	68	23x44	3.0
PI 310941	7	45	56	73	28x52	2.1
PI 310955	10	66	88	52	22x36	2.1
PI 310956	22	42	75	71	30x55	2.7
Och S-12	38	35	8	21	26x40	2.6
Och S-24	68	-	47	-	35x62	2.8
S. chiquidenum Ochoa						
PI 230514	44[b]	99[b]	8[b]	66[b]	34x34	1.8
PI 275269	71[b]	-	61[b]	-	42x42	3.0
S. gandarillasii Ochoa						
PI 265866	99[b]	-	14[b]	-	20x44	2.0
S. gourlayi Hawkes						
PI 210038	23[b]	5[b]	29[b]	42[b]	23x53	3.0
PI 265579	31	79	84	92	23x49	1.6
S. kurtzianum Bitt. & Wittm.						
PI 320271	79	-	65	-	30x55	2.5

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
S. leptophyes Bitt.						
PI 310932	42	71	98	90	16x35	2.0
S. lignicaule Vargas						
PI 310993	71[b]	12[b]	96[b]	50[b]	19x33	2.6
S. maglia Schlechtd.						
PI 210813	61[b]	-	99[b]	-	46x85	4.3
S. marinasense Vargas						
PI 210040	98[b]	-	77[b]	-	33x52	2.2
PI 310944	52[b]	54[b]	90[b]	99[b]	30x55	2.8
PI 310945	15[b]	28[b]	65[b]	55[b]	31x42	2.0
PI 310947	37	46	88	70	38x53	2.6
WRF 1533	13	30	67	93	29x42	2.3
S. medians Bitt.						
PI 265872	67	-	52	-	21x37	1.4
PI 320260	39[b]	73[b]	8[b]	54[b]	22x33	2.8
WRF 1575	66	-	76	-	21x36	2.0
S. microdontum Bitt.						
PI 320304	88	-	61	-	39x60	2.8
PI 320317	99[b]	-	96[b]	-	29x46	2.5
WRF 1283	91	-	40	-	51x82	4.6
S. mochicense Ochoa						
PI 338616	99[b]	-	74[b]	-	22x38	1.9
Och S-20	96	-	98	-	23x35	2.9
S. multidissectum Hawkes						
PI 210042	23	49	46	50	16x30	1.3
PI 210043	57	77	43	17	19x37	3.0
PI 210044	62	-	32	-	21x36	1.8

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
PI 210051	13	37	40	69	22x37	2.6
PI 210052	16	27	48	44	17x41	2.2
PI 210055	23	60	26	51	15x29	1.2
PI 230506	36	74	7	37	16x28	2.4
PI 265876	17	36	49	87	18x40	2.0
PI 275271	6	22	33	28	16x26	2.3
PI 283072	63	-	69	-	29x44	2.5
Och S-9	42	-	72	-	39x58	2.7
S. multiinterruptum Bitt.						
PI 265886	47	35	79	79	17x24	2.1
Och S-27	86	-	54	-	15x18	1.9
Och S-85	88[b]	-	54[b]	-	20x41	1.5
S. pampasense Hawkes						
WRF 1576	67[b]	-	12[b]	-	33x33	2.0
S. sparsipilum (Bitt.) Juz. & Buk.						
PI 265871	98	-	58	-	34x54	1.8
Och SC-95	82	-	56	-	28x48	1.9
WRF 1741	100[b]	-	92[b]	-	25x52	1.6
S. spegazzinii Bitt.						
PI 208562	54	80	98	96	31x54	2.1
PI 208876	27	44	92	95	37x62	3.3
PI 275144	38	83	89	75	32x53	2.9
S. sucrense Hawkes						
PI 283091	94	-	76	-	31x46	1.5
S. venturii Bitt. & Wittm.						
PI 218220	82	-	91	-	27x59	2.4

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
(cultivated species)						
S. x curtilobum Juz. & Buk.						
WRF 1531	61	-	41	-	29x60	1.8
S. phureja Juz. & Buk. (= S. tuberosum Group Phureja)						
PI 225668	61	-	95	-	36x51	1.9
PI 225674	48	78	78	63	29x45	1.5
PI 225679	44	76	57	60	30x52	1.8
PI 225683	62[b]	-	85[b]	-	23x43	1.5
PI 225693	70	-	21	-	19x40	1.6
PI 225695	72	-	73	-	33x62	1.0
PI 225701	72	-	96	-	27x52	1.6
Och SC-105	58	-	76	-	33x60	2.4
S. stenotomum Juz. & Buk. (= S. tuberosum Group Stenotomum)						
PI 195188	21	33	55	58	28x58	2.3
PI 205526	36	85	80	34	26x52	1.9
PI 234009	78	-	37	-	21x36	1.4
PI 234013	59	-	51	-	32x59	1.9
Och S-46	62	62	39	49	27x53	2.6
S. tuberosum L. subspecies andigena (Juz. & Buk.) Hawkes (= S. tuberosum Group Andigena)						
PI 184903	54	-	86	-	27x42	1.6
PI 186177	60	-	43	-	31x52	2.1
PI 195162	40	55	16	9	21x38	2.7
PI 197757	82	-	48	-	33x47	2.2
PI 214426	62	-	82	-	37x64	2.5
PI 225637	87	-	68	-	21x33	1.4
PI 230472	74	-	57	-	40x57	2.0
PI 232041	96	-	13	-	22x33	1.7
PI 232054	53	98	63	46	31x51	1.9

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
PI 232839	52	78	44	82	40x66	2.6
PI 232840	76	-	71	-	30x56	1.7
PI 233984	77	-	44	-	30x47	1.9
PI 233987	45	76	9	44	31x47	2.1
PI 233988	84	-	24	-	33x48	1.5
PI 233994	58	-	80	-	30x61	1.6
PI 234000	78	-	65	-	24x53	1.2
PI 237208	17	48	22	54	29x41	1.9
PI 243373	73	-	42	-	29x58	1.9
PI 243378	90	-	69	-	34x62	1.4
PI 243387	46	84	46	64	33x53	2.6
PI 243390	51	-	17	-	29x45	2.3
PI 243394	86	-	50	-	42x65	2.0
PI 243403	46	74	23	67	30x52	2.1
PI 243419	50	85	64	71	40x69	2.2
PI 243421	94[b]	-	61[b]	-	26x44	2.0
PI 245317	11[b]	35[b]	2[b]	25[b]	44x70	3.7
PI 245320	96	-	99	-	39x68	2.9
PI 245800	81[b]	-	33[b]	-	45x84	2.3
PI 246979	85	-	95	-	38x63	1.6
PI 246497	97[b]	-	13[b]	-	27x54	2.0
PI 280866	81	-	90	-	33x56	2.4
PI 280868	83	-	73	-	29x54	1.9
PI 280869	58	-	17	-	20x38	2.1
PI 280874	96	-	97	-	31x58	1.8
PI 280883	95	-	55	-	28x48	1.7
PI 280884	69	-	82	-	33x60	1.9

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
PI 280887	56	-	84	-	30x53	1.7
PI 280891	86	-	90	-	37x66	2.0
PI 280901	29	65	84	56	28x44	1.6
PI 280905	33	61	32	41	27x48	2.4
PI 280907	49[b]	64[b]	53[b]	11[b]	26x47	1.7
PI 280908	76	-	74	-	25x46	2.0
PI 280909	95	-	58	-	31x54	2.0
PI 280914	37	89	78	42	26x47	1.6
PI 281014	68	-	37	-	31x53	1.5
PI 281021	55	92	51	30	26x47	1.8
PI 281092	65	-	67	-	19x21	1.7
PI 281119	58	95	18	70	28x49	1.4
Och SC-100	77	-	24	-	44x78	2.4
Och SC-103	68	-	53	-	38x66	3.1
WRF 1293	92	-	70	-	45x71	2.3
WRF 1579	92[b]	-	40[b]	-	29x44	2.1
WRF 1584	69	-	77	-	37x61	2.2
WRF 1749	75	-	66	-	42x70	2.7
S. tuberosum subspecies tuberosum (L.) Hawkes (= S. tuberosum Group Tuberosum)						
'Chisago'	83	98	75	61	43x64	2.9
'Norland'	73	96	62	84	46x76	2.0
'Red Pontiac'	82	92	73	71	52x74	3.1
'Russet Burbank'	80	84	59	74	40x68	2.7
'Sebago'	61	85	11	33	43x61	2.5
Minn. Code 5041	91	97	71	82	38x67	1.9
Minn. Code 5202	93	97	65	68	44x65	2.4
Minn. Code 5363	90	97	78	46	42x69	2.1

Table 1 (continued). Relative resistance of tuber-bearing Solanum introductions to aphid infestation.

Species, IR-1 designation, selection, or variety	Potato series according to Hawkes[a] Percentile rank, 1 = resistant				Plant characteristics	
	Green peach aphid		Potato aphid		Height x width (cm)	Vigor 1-5 5 = good
	7/27-30	8/10-12	7/27-30	8/10-12	8/24-9/1	8/24-9/1
W5279-25	83	96	39	35	35x60	1.7
Miscellaneous						
Unidentified						
Och S-5	55	-	86	-	23x45	1.8
Och S-6	18	26	39	39	20x32	2.3
Och S-7	66	-	58	-	20x34	2.1
Och S-11	34[b]	86[b]	6[b]	13[b]	15x22	2.7
Och S-15	5	26	31	5	18x28	2.0
Och S-33	21	19	50	32	22x38	2.2
Och S-34	17	39	25	7	21x39	1.8
Och S-38	98	-	71	-	29x55	2.1
Och S-54	73[b]	-	43[b]	-	17x29	1.5
Och S-60	63[b]	-	11[b]	-	12x15	1.0
Och S-62	78	-	32	-	18x34	1.8
Och S-63	65[b]	51[b]	80[b]	8[b]	47x68	2.0
Och S-64	64	-	98	-	32x50	2.1
Och S-65	89	-	61	-	26x41	1.6
Och S-68	18[b]	29[b]	28[b]	94[b]	17x15	1.2
Och S-77	64	-	80	-	31x59	2.4

[a] J. G. Hawkes. 1963. A Revision of the Tuber-Bearing Solanums (Second Edition). Scottish Plant Breeding Station Record.

[b] Rankings based on sample of less than 10 plants, all others on 10-20.