

A STUDY OF MYZUS PERSICAE (SULZER) (APHIDIDAE, HOMOPTERA)
WITH SPECIAL REFERENCE TO SWEET POTATOES

by

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INTRODUCTION

A study in advance of insect infestations and disease introductions is one of the best methods of preparation for possible future encounters of economic importance. For this reason, it was suggested to the writer by Dr. Roger C. Smith, Head, Department of Entomology, Kansas State College, that a study of the relation now existing in Kansas between the green peach aphid, Myzus persicae (Sulzer) (Aphididae, Homoptera), and the culture of sweet potatoes, Ipomoea batatas Lam., should be made in view of recent investigation of the possibility that this insect is a vector in the transmission of the causative organism responsible for internal cork disease of sweet potatoes.

The determination of the prevalence of the green peach aphid in the Manhattan and Kaw valley regions on peach, which is one of its primary hosts, and on sweet potato plants, which is one of its secondary hosts, was the main object in undertaking this study.

This is a preliminary report on the relation existing between the green peach aphid and sweet potatoes in Kansas. It is hoped that this study may prove of value if internal cork disease of sweet potatoes is introduced to fields here now profitably planted in sweet potatoes. That this introduction is possible will be pointed out from the experience of workers in other states as well as from present practices among growers in this state.

METHODS AND MATERIALS

To make this study complete, it was necessary to trace the

life history of the aphid as it occurred during this season and determine the method and extent of actual or possible infestation of sweet potatoes in the present practices of producing a crop in Kansas.

In obtaining the above information, it was decided that field observation would be the ideal method, bolstered where necessary by laboratory experimentation. However, since sweet potatoes had not been previously reported as a host plant of Myzus persicae (Sulzer) and since it was impossible to predict a field infestation, steps were taken to provide material for laboratory study of an artificial infestation.

Sweet potato roots to provide suitable shoots and leaves upon which aphids might be induced to feed were placed in containers in water on April 8 and on April 27 and maintained throughout the study. No plant foods or minerals other than those present in tap water were supplied to the roots. The foliage produced by the sprouting of these roots, and cuttings made in hot bed and field were a satisfactory source of food for aphids kept in the laboratory.

After their spring emergence, colonies of the green peach aphid were maintained in the laboratory on peach cuttings made from several trees in this area. Production of alate forms was the main purpose in maintaining these cultures and since it has been pointed out by Wadley (1922) that nutrition is one of the important factors in the production of alate forms, it was decided not to add any plant food to the water.

Ten peach trees growing in the township of Manhattan were selected from the standpoint of the number of colonies established on them as the best upon which to follow the progress of infestations. These trees were inspected at least twice weekly and observations on the progress of the colonies recorded. Other peach trees were checked and an effort was made to locate stem mothers or colonies on plum or cherry trees which Mason (1940) records as other winter hosts.

Variation in color patterns was noted in the early stem mothers collected. This aphid is known to be a variable species in color and in certain structural characters. It was therefore suggested that an effort be made to observe the range of color variations of the various forms and to check any changes that might be noted on the different host plants.

For this purpose, drawings were made and mimeographed of both an apterous and an alate aphid. On these forms were recorded the color variations noted, the host plant, the locality, and the date collected. These color records were made from fresh material as soon as possible after the specimen was brought into the laboratory.

The identification of the aphids collected was checked by comparison with material submitted to the United States Department of Agriculture, Bureau of Entomology and Plant Quarantine, Division of Insect Identification, Washington, D. C. on May 3, 1948 and determined by Miss Louise M. Russell of that division. Representatives or progeny of all material submitted were

retained for future comparisons. The aphids determined by Miss Russell were collected on peach trees in Manhattan, Kansas on April 20, 28 and May 3, 1948. They were submitted in separate vials and each date represented the following forms: the green striped form, the greenish yellow form, and the pinkish form of the apterous viviparous females. Some alate forms were also included.

REVIEW OF THE IMPORTANT LITERATURE

The aphid

The most important entries in the synonymic table of this species are the original description of the species and the placing of that species in its present genus. They are as follows:

Aphis persicae Sulzer, Abgekürzte Geschichte der Insekten, P. 105, 1776.

Myzus persicae (Sulzer) Passerini, Fli Afidi, P. 35, 1860.

Mason (1940) lists twenty-eight synonyms for this aphid. Its practically world-wide distribution suggests that its full synonymy might reach staggering proportions.

This species belongs to Macrosiphina, which is one of the largest and most important groups of the tribe Aphidini, sub-family Aphididinae. The genus Myzus can be separated from the other genera of Macrosiphina by the convergent antennal tubercles which are small protuberances from the head at the inner borders of the antennal bases.

Myzus persicae (Sulzer) has been assigned the common name

of "green peach aphid", Muesebeck (1946), in preference to some other names by which it is still referred to in the literature. The most popular other common name by which many writers refer to this aphid is the "spinach aphid" which name is derived from the aphid's preference for this plant as a secondary host when it migrates from its most common winter host, the peach, in this and many other areas.

It does not appear necessary to review the many papers that have been published on the biology, control, and the feeding habits of the green peach aphid, Myzus persicae (Sulzer), since much of it does not relate directly to this problem. Furthermore, the works of Gillette (1908), Theobald (1926), Hottes and Frison (1931), Patch (1938) and Mason (1940) gave an adequate synonymy, the technical descriptions, references, and lists of host plants.

Mason (1940), in his work on a revision of the genus, included technical descriptions of the stem mother, apterous viviparous female on the primary host, spring migrant, summer apterous form, summer alate form and fall migrant, male, and oviparous female forms. These are sufficient for an accurate determination of specimens. He also included keys for the separation of both alate viviparous females and apterous viviparous females.

Patch (1938) recorded three hundred and twenty-two species of plants representing sixty-eight families which are known to serve as hosts for this aphid. The sweet potato, Ipomoea batatas Lam., is recorded by Patch (1938) as having been referred

to as a host for the green peach aphid by Gould (1930).

This species is separated from other members of the genus Myzus Passerini in existing keys in the alate form by cornicles distinctly swollen towards the tips and the abdomen has a large dark dorsal area slightly posterior to the middle. If the cornicles are not distinctly swollen then it may be identified by the unguis or spur of the sixth antennal segment being subequal in length to the third antennal segment. However, in some forms when the cornicle is two to three times as long as the cauda, identification is made by determining whether the length of the unguis is four or less times as long as its base.

Apterous viviparous females if the cornicle is distinctly swollen can be recognized by the length of the cauda being about three times the distance between the antennal tubercles. Apterous females without distinctly swollen cornicles are of this species if the cornicle is slightly larger than (but never twice as long as) the unguis or about twice as long as the cauda.

Past control work on this and other aphids is so well known and since aphid control is in the process of change with the introduction of newer insecticides, no historical references on control are cited here.

The sweet potato

The sweet potato, a native of tropical America, naturally thrives best in the warm portions of the United States. The actual date of introduction into Kansas is not known but several

areas are well fitted for its cultivation.

A publication of national scope on sweet potato growing by Miller (1919, revised), Beattie and Zimerley (1940), gave a very good survey of methods and problems in national sweet potato production. Elmer (1938) supplemented our information with an excellent work on production methods and culture problems in Kansas.

Internal cork disease of sweet potatoes

Internal cork disease of sweet potatoes was first reported by Nusbaum (1946). It was first found in the spring of 1944 in South Carolina and since that time has been reported in Alabama, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. An exceptionally serious disease, it was reported to be carried from locality to locality by means of seed stock or plant distribution and Myzus persicae (Sulzer) has been suggested as its vector.

This disease known as internal cork, apparently a virus, is characterized by dark brown to blackish, cork spots, streaks and irregular areas within the flesh. These hard and gritty areas, scattered irregularly through the flesh, are unpleasant in the mouth even though they do not have a very marked unpleasant flavor.

With the exception of some memorandums on the disease from the Edisto Experiment Station, Blackville, South Carolina, very

little information has actually been made available concerning it.

Leaf symptoms are reported as first vein feathering of the leaves followed by ring spotting with reddish or purplish blotches. These symptoms are climaxed by bronzing.

There are no external symptoms on the root itself.

THE APHID IN KANSAS

Stem mother and eggs

The initial step in the study of this problem was to examine both properly cared for and neglected orchards and backyard peach trees for eggs and stem mothers of the green peach aphid. An examination March 30, 1948 of peach trees on the State Horticultural farm by a group of faculty members of the Kansas State College Department of Entomology headed by Dr. Roger C. Smith and accompanied by the writer revealed neither stem mother nor eggs.

However, an examination on the following April 3, 1948 of several trees in the Manhattan area revealed stem mothers. One tree which had aphid eggs in the cracks of the bark near buds on one of its branches was found. There were no newly hatched aphids observed on this tree. Nymphs emerging from these eggs were found to be stem mothers of the green peach aphid. The eggs were microscopically examined for any chorionic sculpturings that might possibly give characteristics for identification but none were found.

The stem mothers found varied in color from green through

yellow to a deep pink or almost red. Very few of these stem mothers were removed with the exception of those taken to start colonies in the laboratory. The colonies were left undisturbed to provide a maximum number of aphids for observation. Colonies discovered were tagged and dated for future reference. Small tags marked with a number two lead pencil were used.

By April 11, 1948 the colonies were found to be well advanced with no or slight indication of curling peach leaves. However, on April 20, 1948, the colonies were sufficiently large to have covered several leaves in the vicinity of the original position of the stem mother and to have caused pronounced curling of the leaves upon which the aphids were feeding. The last stem mother was observed in the field on April 26, 1948.

Apterous and alate viviparous females
on the primary host

The first generation of apterous viviparous females produced by the stem mothers of the green peach aphid was observed on unsprayed peach in the Manhattan area on April 5, 1948. These peach trees had not yet bloomed. They did not bloom until April 15, 1948. By April 20, 1948 the colonies had enlarged considerably and three colonies were observed to have alate viviparous females among the apterous forms. These alate or winged forms were present in colonies that still had stem mothers with them and were members of the third generation of progeny. Wadley (1922) records that a large proportion of aphids of the species, Rhopalosiphum prunifoliae Fitch, in his

experiments when starved or overcrowded early in development became winged, as did the progeny also of those remaining wingless in spite of poor nutrition. Weed (1927) using Myzus persicae (Sulzer) studied the effects produced in reproduction and longevity by variations of temperature and humidity.

On April 25, and 26, 1948 a survey was made to determine the number of colonies which had winged forms present and only one colony was observed in this condition.

On April 28, 1948 a check of the same trees was again made and only three colonies were observed to have winged forms present. Many aphids were observed with developing wing pads indicating that they would be winged.

Between April 28, 1948 and May 5, 1948 a larger proportion of the growing aphids developed wings and on May 5 noticeable instances of leaf curl injury on several of the trees were noted to be almost or completely devoid of aphids.

Observations made on other trees on May 6, 1948 showed a high percentage of abandoned leaves and the migration of apterous forms to younger, more tender leaves. Forty-two of forty-four peach seedlings under one tree were observed to be heavily infested with colonies of the green peach aphid.

An inspection of several peach trees near St. Marys, (Shawnee County), Kansas on May 9, 1948 revealed neither apterous nor alate forms or any indication of leaf curl injury. These trees had not been sprayed.

The same color variations which were observed in the stem

mothers were recorded for the apterous, viviparous females on the primary host. The reddish stem mothers of lighter hue tended to produce yellowish progeny.

The last aphids observed on peach were a few apterous viviparous females on May 20, 1948 in Manhattan, Kansas.

Efforts to force flights of winged forms from peach were largely unsuccessful. The aphids either fell to the ground or returned to the peach.

Apterous and alate viviparous females
on the secondary host

On May 5, 1948 alate forms were observed to transfer voluntarily in the laboratory from peach cuttings to sweet potato sprouts which were being grown in the same room and to establish themselves on these plants. These alate forms began producing apterous progeny and by May 14, 1948 the colonies were well established. Preference was shown by the aphids for positions on the undersides of leaves at the bases of veins, on suckers, and on the tender tips of shoots and leaves. However, aphids were also found feeding on the upper surfaces of shaded or twisted leaves and on lower stems. On May 29, 1948, the first alate forms were observed in these colonies.

In company with Mr. Rockford G. Yapp, Assistant State Entomologist, an examination for sweet potato weevil and green peach aphid was made by the writer of sweet potato hot beds along the north bank of the Kaw river on May 10 and 11, 1948 from Manhattan to Kansas City. In addition to examining the hot beds, an attempt

was made to locate peach trees in the vicinity of the various beds and examine them for green peach aphid or leaf curl as an indication of their previous presence.

Twelve beds were examined of which five were found to contain both apterous and alate forms. Peach trees upon which the green peach aphid was present or aphid curled leaves occurred were in the vicinity of all the beds examined.

The beds examined were located in or near Edwardsville, Bonner Springs, and Topeka, Kansas. At Edwardsville, five beds were examined, three of which had green peach aphid present. In Bonner Springs two beds were examined and both had very light infestations. The beds examined in and near Topeka, five in number, had only recently been uncovered and apparently had no aphids present. Many other beds in this locality were still covered at the time of the examination.

On returning to Manhattan, Kansas, the writer examined two local hot beds and both were found to be slightly infested with green peach aphid. Reports on two other beds in the vicinity and later examination indicated that at the same time they both had some aphids present. With the exception of one bed, there were peach trees in the vicinity of all beds that had been infested by green peach aphid.

The results of these observations and reports were that in the portion of the Kaw valley studied nine of the sixteen beds had green peach aphids present.

The aphids collected on this trip were returned to the

laboratory and compared under the microscope with those previously collected on peach in the Manhattan area.

Other insects noted in these examinations of sweet potatoes were tortoise beetles and sweet potato flea beetles. Several other incidental insects were noted but each species occurred only once.

The green peach aphid occurred on the stems and the underside of leaves. Numbers in no instance were large and in most cases the aphids were isolated individuals not yet mature.

An examination of the hot bed belonging to Dr. O. H. Elmer, Associate Professor of Botany and Plant Pathology, Kansas State College on July 1, 1948 showed large colonies of the green peach aphid which had survived the adverse weather in the corners of the beds and in protected places. However, an invasion of grasshoppers between July 1 and July 7 eating the tender sweet potato shoots reduced the numbers of colonies to the point where aphids were difficult to find.

Aphid colonies which were increasing in size in late May and early June were decimated in June by heavy rains which left water standing in most low spots in fields. These rains were so extensive that cultivation of local fields was postponed until late June because of rain and wet ground.

Infestation of sweet potatoes was secured in the laboratory on June 9, 1948 by shaking alate and apterous forms of the green peach aphid from Chenopodium album Linnaeus, lamb's quarters, collected in Manhattan, Kansas. This protected infestation

built up and heavily infested terminal shoots of all laboratory sweet potato plants.

Aphids were not observed in the field on sweet potato plants until June 29, 1948 when specimens of the green peach aphid were found in an overgrown garden plot in Manhattan, Kansas. Very few aphids were noted but both alate and apterous forms were present. These plants had not vined out to any extent and in the examination of fifty plants, fourteen aphids were found.

The following day a one acre field planted in sweet potatoes was examined and aphids were found on the undersides of most leaves of the plants. The aphids were all apterous viviparous females and were usually single individuals without progeny.

On July 1, 1948 an examination was made of the sweet potato experimental plot belonging to Dr. O. H. Elmer. No aphids were found on plants on low ground which was still too damp to work.

An examination of plantings on higher ground on the same day revealed both apterous and alate forms of the green peach aphid. Only two alate forms were observed, but ten rows of plants out of fifteen rows inspected in a cross section of the ninety-five rows planted were hosts to aphids. Here again the aphids were isolated individuals, one to four to a leaf and only one was found with progeny.

Plantings of sweet potatoes totaling four acres on Hunter's Island, a cultivated area south of Manhattan, were examined on July 5, 1948. Green peach aphids, isolated individuals, were found in all plots examined. Cultivated peach trees were in the vicinity of all plantings.

A return examination of Doctor Elmer's plantings on July 7, 1948 showed three per cent of all leaves examined to be infested. Again on July 13, 1948 the field was examined and only a two per cent infestation was found. Alate forms were observed on both dates. Most aphids found were on the underside of leaves near the veins.

An attempt to find the green peach aphid on other hosts in the Manhattan area gave a regular occurrence on only three plants. This aphid was found on lamb's quarters, Chenopodium album Linnaeus, on tomato and cabbage. Those individuals found on tomato were all alate forms and were not noted to reproduce progeny. No variation in color was noted in the forms inhabiting these secondary hosts from those recorded on peach.

Other forms

An attempt to produce sexual forms by reduced amounts of light, lowering temperatures for gradually longer periods, and reduced nutrition was unsuccessful.

As fall advances there are produced on the secondary host alate forms with distinctly swollen cornicles. These aphids return to peach from the summer host. One of these alate forms is a female which upon its return to peach produces the oviparous female. This female upon reaching maturity mates with the other alate form, a male, and produces a shiny black oval egg which is deposited in the crack of a branch or near the terminal portion of the branch.

Seasonal life history

This life cycle demonstrates the generalized life cycle of a migratory aphid as expressed by Hottes and Frison (1931).

The green peach aphid passes the winter as black, shiny, oval egg on the bark of peach, plum, and cherry trees. During the first part of April, stem mothers which are usually pinkish in color, hatch from these eggs. This hatching was found to occur slightly previous to the blooming of peach. The stem mother, upon reaching maturity begins to produce apterous viviparous female progeny. The usual color of these small aphids is a pale yellowish green with three darker green dorsal longitudinal stripes. These females usually remain on the peach for two or three generations. After this a generation which develops wings is produced. They then migrate to many kinds of garden and field plants. On these summer hosts, alate or winged forms are developed which scatter to other plants. With the approach of cold weather in the fall, some winged females return to the peach where they give birth to wingless, sexual females. The males are produced at the same time on the secondary hosts by the apterous females. The true females, mate, deposit eggs on peach or other winter hosts.

THE SWEET POTATO IN KANSAS

Hot bed and field plantings

Field plantings of sweet potatoes are made with sprout or

"slips" grown from roots placed in specially designed, sanded beds early in the year.

Recommended planting for roots in Kansas is between April 1 and 20. Frost this year appeared sufficiently remote by May 1 that field plantings could be made.

The first known field plantings were made on May 10, 1948 near Edwardsville, Kansas and on the following day near Topeka, Kansas. Other plantings in the vicinity were made on May 12, 13, 17, and 25 and June 2 and 6.

The total field plantings made in the Manhattan area other than gardens for the 1948 crop were approximately six and one-half acres.

Possible introduction of internal cork disease into Kansas

An unstable market last year caused many growers to harvest their crop and sell it as early as possible. Some for lack of time neglected to make field selections for the 1948 hot bed plantings. Poor storage possibly caused the loss of some other seed potatoes.

Those who saw the market possibilities of this year and were without seed attempted to find seed and experienced some difficulty in obtaining it.

In the advent that a source of seed potatoes had not been found the only recourse other than to wait and purchase plants from other growers would have been to purchase roots on the food market and plant beds with these.

At the time when most beds were being planted the sweet potatoes that were available on the market in this area were almost entirely those grown in Louisiana and Georgia. In both of these states internal cork disease has been found.

It has been learned from a report by Barss (1946) of a conference on the disease at the Edisto Agricultural Experiment Station, Blackville, South Carolina, that internal cork disease has been spread or introduced into new areas by planting infected seed. Since no external symptoms have been recorded, infected roots could not, without cutting, have been selected from healthy roots.

For these reasons, it was possible for producers or small backyard growers to purchase roots available on the market that when planted could be a source of the disease for other growers in this state.

The threat of importation of this disease into Kansas was considered grave enough for the state of Kansas to establish a quarantine making it unlawful for any person (company or corporation) to ship or carry sweet potato planting stock, including seed roots, plants, vines, cuttings, or draws into this state from states where the disease has occurred, is known to occur, or is suspected of occurring. These states were listed as: Alabama, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia.

Food potatoes from the states listed were not placed under quarantine so the quarantine may not be completely effective.

Internal cork disease of sweet potatoes as far as is known has not yet been introduced into Kansas. It was proper for Kansas to take measures to protect her crop not only to insure production of a crop free from this disease but to enable her to become a source of seed stock for those states which, because of local or proximate infestation, must find a new source of uninfected seed.

The aphid on sweet potatoes

The following table of the observed progress of the infestation from the time of egg emergence of stem mothers on the primary host, peach, to the actual establishment of colonies on sweet potatoes in the field shows the relation of the green peach aphid to the present culture of sweet potatoes in Kansas.

Table 1. Myzus persicae (Sulzer) as observed on peach and sweet potato in Kansas.

	March		April		May		June		July	
	1	15	1	15	1	15	1	15	1	15
Peach			1	2	3					
	1	1	2	3	4	3				
				4						
Sweet potato hot bed					3	3	3	3	3	
					4	4	4	4	4	
Sweet potato field							3	3	3	
							4	4	4	
Sweet potato laboratory					3	3	3	3	3	3
					4	4	4	4	4	4

1, egg; 2, stem mother; 3, apterous viviparous female; 4, alate viviparous female

It should be pointed out in the above table that only the approximate dates are indicated because the first observance of a form in the field may not constitute its first actual occurrence.

The fact is clearly demonstrated above that from the information obtained there can be no alternation of planting dates to escape infestation of the hot bed or field crop. However, it should be pointed out that sweet potatoes planted after June 1, 1948 will probably be infested only by alate green peach aphids flying from other summer secondary hosts if original planting stocks were free of aphids.

No structural damage, such as, leaf curl or discoloration, was observed on any sweet potato upon which the aphids were feeding. Heavily infested shoots in the laboratory showed no ill effects either while the aphids were feeding or after they were removed.

CONTROL OF THE APHID

In this study no attempts were made to make a comparative test of control measures. However, from observations made in the field and a survey of the literature several suggestions can be made.

The acrobat or tent building ant, Cremastogaster lineolata (Say), (Formicidae, Hymenoptera), was observed from April 20, 1948 to May 11, 1948 caring for colonies of the green peach aphid on peach in return for honey-dew. The ant was actually observed to carry aphids from one leaf to another distributing them about

the tree. It might therefore be necessary to control this ant to prevent spread of infestations.

Parasites of the green peach aphid were not observed in the Manhattan area though there were present numerous parasites observed on other species of aphids. A collection of parasitized aphids was made on June 15, 1948. These emerged June 16 and some were observed to copulate the same day. They were determined by the writer to be Lysiphlebus testaceipes (Cresson) Braconidae, Hymenoptera). Both fertilized and unfertilized females were introduced to colonies of the green peach aphid. No effort was made to control temperature and humidity. No oviposition was noted and no parasitized aphids were observed.

On July 7, 1948 the writer received from Mr. Leon Lungstrom, graduate student, Kansas State College, sweet potato leaves infested with green peach aphid collected near Lindsborg, Kansas. Some of the aphids were parasitized and on July 10 emergence of Lysiphlebus testaceipes was obtained.

Predators of the green peach aphid were first observed on April 20, 1948 and then through the rest of the season they were much in evidence. Of the Coccinellidae the most frequently observed was the convergent lady beetle, Hippodamia convergens Guer. Other predators observed were several species of Syrphus flies and aphid-lion. The lady beetle and Syrphus flies were much more in evidence after the heavy June rains than before, possibly due to the necessity of increased activity in search of hosts.

Chemical control of aphids with the development of new

insecticides has rapidly advanced and the latest insecticides are now in the process of undergoing major field tests.

The following table has been prepared giving insecticides and dosages for the control of aphids on sweet potatoes.

Table 2. Insecticides and dosages for the control of aphids on sweet potato.

Materials to be used	Form	Dosage
40% nicotine sulphate ("Black leaf 40")	Spray	1 ounce plus 3 ounces soap to 5 gallons of water
Laundry or granulated soap	Spray	1 pound to 5 gallons of water
Pyrethrum extracts (0.9% pyrethrins)	Spray	3 teaspoonfuls to 5 gallons of water
Rotenone products (4 - 5% rotenone)	Spray	3 ounces plus 3 ounces of skim milk powder to 5 gallons of water
Toxaphene	Spray	7 ounces 50% wettable powder to 5 gallons of water
	Dust	7 ounces 50% wettable powder in 2 pounds talc or other dilutent
Chlordane	Spray	3 ounces 50% wettable powder to 5 gallons of water
	Dust	5% 40 pounds to the acre

Application of insecticides on sweet potatoes must be made to the undersides of leaves where field examinations have found the aphids. This application can be made by any hand or power

sprayer or duster that will apply the spray or dust to those portions of the leaves or stems that are infested.

Control methods for aphids on peach are well known. One of the later developments which is believed to be applicable to the problem here is contained in the report on DDT used to control the green peach aphid in Colorado by Newton and List (1947). The authors applied to parts of three peach orchards in September 1945 a spray of DDT (0.8 pound to 100 gallons of water) and achieved a reduction in the number of buds infested, stem mothers, and young of 95.23 per cent as compared to check plots in the same orchard.

Fall sprayings such as the one cited above and prebloom sprayings would appear to give adequate control and prevent infestation of secondary hosts.

SUMMARY

In the study of the relation in Kansas between the green peach aphid, Myzus persicae (Sulzer) and the sweet potato, it was the procedure to rely in the most part upon field observation of the life cycle of the aphid as it included the sweet potato as a secondary host.

The aphid was first observed at Manhattan, Kansas on April 3, 1948 on one of its primary hosts, the peach tree, as an overwintering egg and as a stem mother. The increase in population was followed as the stem mother produced her progeny. The appearance of the first winged forms was noted on April 20, 1948

on peach trees. An unsuccessful attempt was made to follow their migration. The last occurrence of this aphid noted on peach trees in Manhattan, Kansas was May 20, 1948. These occurrences were noted to provide a complete study of the aphid in the event of a future need.

The green peach aphid was sought on sweet potatoes in Kansas and was found on the hot bed and field plantings. It was found on hot bed plantings from May 10 to July 7, 1948 and on field plantings from June 29 to July 13, 1948. Other recorded secondary hosts were examined and those upon which it was found with any frequency were lamb's quarters, the tomato, and cabbage. The numbers of aphids found upon field plantings were watched and on July 7, 1948, it was estimated in one field that three per cent of leaves were infested. In the same field on July 13, 1948 only two per cent of the leaves were estimated to be infested.

This field study was supplemented by a corresponding study of the aphid as it migrated to sweet potato in the laboratory. This migration took place voluntarily on May 5, 1948 from infested peach tree cuttings to sweet potato roots sprouting in water. The colonies so established produced wing forms on May 29, 1948.

The introduction of internal cork disease into Kansas was pointed out to be possible. Food roots are not regulated and there is not any regular supply of seed. There is nothing to prevent the using of sweet potatoes available on the market as seed and these potatoes may be infected. There is no external evidence of disease on infested sweet potatoes. Potatoes avail-

able this year on the food market in Manhattan were from Louisiana and Georgia. In both of these states the disease has been reported.

This aphid was transferred by hand from lamb's quarters, Chenopodium album Linnaeus, to sweet potatoes. Colonies were established on the sweet potato.

Large infestations of the green peach aphid which were maintained in the laboratory on sweet potatoes during May and late June and large infestations which were observed in some hot beds in July caused no apparent damage to the sweet potato foliage.

Color records of the various forms were noted and recorded on mimeographed forms one of which is included with this report. The color range for the stem mothers and apterous viviparous females on the peach tree was from a green to a deep pink or almost red. The alate forms on the peach tree and sweet potato varied only in the intensity of the color. All apterous viviparous females observed on sweet potatoes were a light yellow color.

CONCLUSIONS

As a result of these observations and a study of the published works on the green peach aphid, the following conclusions have been reached:

1. The green peach aphid was a common aphid on peach trees, and on sweet potato plants in hot beds and fields in that portion of the Kaw valley examined during these studies.

2. This aphid was found to be capable of flying from the peach tree to the sweet potato plant either in the hot beds or fields. Such flights occurred during these studies.

3. This aphid can transfer from other secondary hosts to sweet potato plants. Such a transfer was made this season.

4. This aphid flies from sweet potato plant to sweet potato plant. Such flights were observed this summer.

5. Planting of aphid infested sweet potato plants from hot beds can result in infested field plantings.

6. Internal cork disease of sweet potatoes could be introduced into Kansas by the use of infested food roots for sprouts in hot beds. Food roots found in stores at planting time were observed to be from Louisiana and Georgia.

7. This aphid has been found in numbers on sweet potato shoots but there was no apparent structural damage to the stems or foliage by this aphid.

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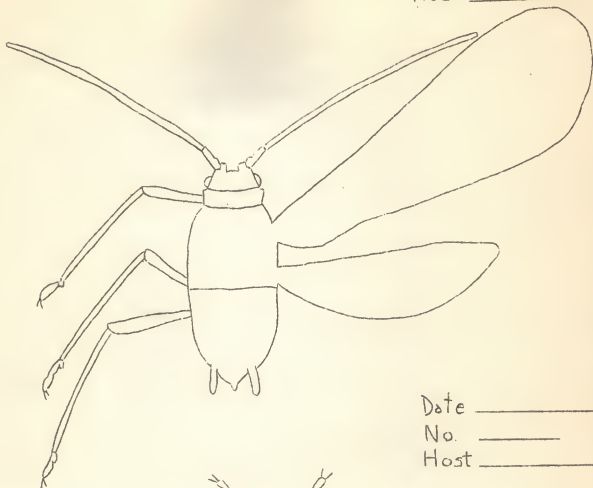
Previous training by those instructors under whose guidance courses were pursued both at Kansas State College in graduate work and at Rockhurst College in undergraduate work must be acknowledged.

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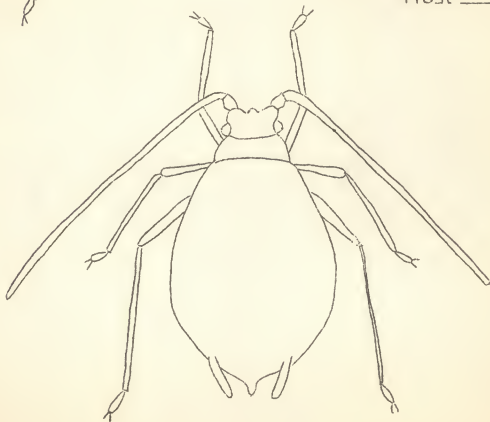
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A P P E N D I X

Date _____
No. _____
Host _____



Date _____
No. _____
Host _____



EXPLANATION OF PLATE I

- Fig. 1. Egg of the green peach aphid Myzus persicae,
(Sulzer) on peach (Much enlarged)
- Fig. 2. Typical peach curl resulting from feeding of
the green peach aphid (Reduced slightly)
- Fig. 3. The green peach aphid on a sweet potato
shoot (x 2)

PLATE I



Fig. 1



Fig. 2



Fig. 3

EXPLANATION OF PLATE II

Myzus persicae (Sulzer), the green peach aphid

- Fig. 1. Apterous viviparous female from a primary host,
peach (x 25)
- Fig. 2. Apterous viviparous female from a secondary
host, sweet potato (x 25)
- Fig. 3. Alate viviparous female from a primary host,
peach (x 25)
- Fig. 4. Alate viviparous female from a secondary host,
sweet potato (x 25)

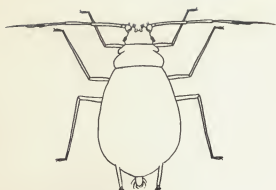


Fig. 1

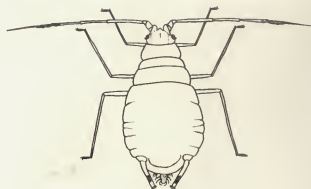


Fig. 2

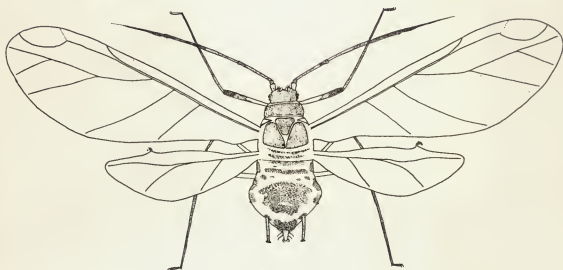


Fig. 3

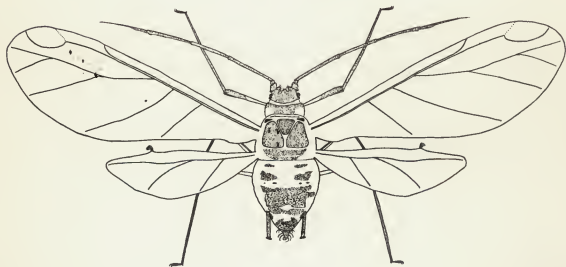


Fig. 4

