Co.; (3) fluvalinate (Spur 22EW at 0.05 lb ai by Zoecon Co.); (4) permethrin (Pounce 3.2 EC at 0.05 lb ai by FMC Corporatio(n); (5) MAT 5927 50WP at 0.03 lb ai by Mobay Chemical Corporation; (6) methomyl (Lannate 1.8L at 0.23 lb ai by DuPont de Nemours Co.); and (7) acephate (Orthene 75SP at 0.38 lb ai by Chevron Co.). Treatments 1, 4 and 6 were insecticides registered for GPA on peach, whereas treatments 2, 3, 5 and 7 were not-registered insecticides at the time of evaluation. Treatments 1 - 4 were pyrethroids, treatment 5 was an experimental aphicide, treatment 6 was a carbamate, and treatment 7 was an organo-phosphate.

Each insecticide was applied to five single-tree replications («Blake» variety) arranged as a randomized block. Check (unsprayed) trees were maintained for each insecticide group treatment. Treatments were evaluated on 21 - 22 May by counting the number of apternea aphids per colony on each tree. The number of curled leaf clusters was also recorded. Duncan's Multiple Range Test (6) was used to determine significant differences between treatments (at $P \leq 0.05$). Data were transformed to $\log_{10}(x + 1)$ for statistical analysis.

Insecticide Timing Study. To determine the time effect of insecticide application on GPA control, methomyl 1.8L at 0.23 lb ai/100 gal, acephate 75SP at 0.38 lb ai/100 gal, and permethrin 3.2EC at 0.05 lb ai/100 gal were used during the spring of 1985. Each treatment was applied at one of four stages (pink, petal fall, shuck fall, first cover) of host development. Trees were randomly chosen from each of the five plots for this purpose in a randomized block design.

Application dates were: 8 April (pink stage), 18 April (petal fall stage), 4 May (shuck fall stage), and 18 May (first cover stage). Evaluation of all treatments was made on 21 - 22 May by counting the total number of live colonies and curled leaf clusters per tree. Statistical analysis of variance among treatments was the same as that of the insecticide evaluation at petal fall stage.

Results and Discussion

Overwintering and Seasonal Abundance. GPA may overwinter as eggs behind buds (14), or as nymphs and adults in drainage ditches (13) in Washington State (USA). Examinations of peach branches during the winter of 1984 failed to reveal any overwintering eggs on buds and smooth bark areas. GPA appears to overwinter on plants other than the peach such as weeds.

Aphid counts were made in 1984 but infestations were too low to yield useful data. The low aphid was probably due to a severe winter freeze and subsequent increase in the number of predators in the plot. The earliest apterous aphids were found on 24 May, the earliest winged aphids on 6 June, the peak production of alate occurred on 11 June, and the last alate aphids were found on 21 June.

While observing winged migrants in early summer, nymphs and winged adults were discovered on weeds, especially on dandelion, *Taxaacum officinale* L., near the base of two of the ten trees observes. Allate fall migrants appeared in late summer and moved to peach trees in September (1984). On 22 October (1984), alate male aphids were observed among sexual females produced by the migrants. Later observations upon or around peach buds and the smooth part of twigs revealed no eggs. Aphids probably completed development upon the peach trees and fell with leaves to the orchard floor where they overwintered on as mature females in and around the orchard. No oviparous reproduction was observed.

High infestations were observed in 1985. Most colonies infested the central part of the tree and spread as apterae crawled to the upper parts. Aphids were initially detected shortly after petal fall (23 April) with an average of 32.5 wingless aphids per colony. The first generation peaked one week after the shuck fall stage (11 May) with an average of 14.6 colonies per tree and 45.8 wingless aphids per colony. The population was composed of parthenogenetic females giving birth to living young. Populations declined rapidly to a low number on 20 May. Aphids left peach trees three weeks after the shuck fall stage (25 May).

The first alatae appeared on the upper terminal leaves 11 days after the first apterae were observed on 23 April. Most alatae appeared after 17 days. This may be sufficient time for the maturation of a single, and there may have been only two generations on peach trees during the spring.

The production of variable numbers of alatae in each tree over an extended period of time that there were sufficient winged migrants to infest peaches and other hosts throughout the spring. Development within colonies varied considerably and the exact number of alatae from any site could not be estimated over the whole period. The duration of migration was inconsistent among colonies.

Migration to weed hosts began on 11 May and lasted for 10 days. All flight activity in the area ceased two days after following dispersal of the colonies. Alatae maturing on peach, were the first migrants. Their parents, apterous viviparous females, which were the most common forms found on peach leaves during the season, could only migrate from one leaf to another when the leaves were in direct contact. Alatae are, therefore, the only forms migrating to reach the secondary hosts such as nearby weeds during late spring.

Since the first insects migrating to secondary hosts are probably the progenitors of the alatae appearing in midsummer, aphid control early in the season will reduce the number of alatae, and therefore lessen the chance that treated trees will later be reinfested.

Leaves with heavy aphid infestations showed considerable crinkling and curling, consistent with previous reports of peach injury (11, 14). Two types of symptom were observed: a) severe helical curling on young leaves, where aphid colonies lived inside near the mid-rib and fed by sucking sap; and b) leaf curling starting from both leaf edges and progressing toward the mid-rib. Two weeks after the lower part of the tree was severely infested, leaves yellowed and fell. Leaves in the upper level were only lightly infested until later in the season.

Weed and cover crops on the orchard floor served as secondary host plants of alatae between mid-May and early July. A large build-up of aphids occurred on the floor of the orchard between trees and on weeds located near trunks. The following secondary host plants were recorded: (1) prickly lettuce, *Lactuca serriola* L. and white-top fleabane, *Erigeron annuus* L., annual or biennial weeds; (2) goldnrod, *Solidago canadensis* L. and dandelion, *Taraxacum officinale* L., perennial weeds. Prickly lettuce and goldenrod were the most favored weed hosts for apterous and alate aphids. Few aphids were found in an alfalfa field located at the orchard border.

Insecticide Evaluation at Petal Fall Stage. Fenvalerate, fluvalinate, and MAT 5927 provided excellent aphid control (Table 1). These insecticides, however, were not significantly better than MO 070616 or permethrin, but were significantly better than methomyl and acephate. Pyrethroids performed significantly better than carbamate or organophosphate insecticides.

Table 1. Insecticide evaluation for green peach aphid (GPA) control at petal fall stage (1985).

No. Treatment[a]	Rate per 100 gal (lb.ai)	Mean no. colonies per tree	Mean no. curled leaf clusters per tree[b]	GPA Total means
1.methomyl 1.8 L	16.0 oz (0.23)	7.4 ab	15.4 a	22.8 ab
2. acephate 75 Sp	8.0 oz (0.38)	7.8 ab	5.8 b	13.6 bc
3. permethrin 3.2 EC	2.0 ox (0.05)	2.4 bc	2.4 bc	4.8 cd
4. fenvalerate 2.4 EC	2.7 oz (0.05)	1.6 c	1.4 bc	3.0 d
5. MO 070616 1.9 EC	0.85 oz (0.01)	4.0 bc	4.2 bc	8.2 cd
6. fluvalinate 22 EW	3.2oz (0.05)	1.2 c	0.2 c	1.4 c
7. MAT 5927 50 WP	1.0 ox (0.03)	1.8 bc	0.6 c	2.6 d
8. Check	Unsprayed	25.8 a	14.8 a	40.6 a

a. For each treatment, any two numbers in the same column followed by the same letter are not significantly different as determined by Duncan's multiple range test at the 5% level. Data were transformed to $\log_{10}(x + 1)$ for analysis.

b. No aphids were present.

Insecticide Timing Study. When treatments, 1, 5, and 9 were applied at the pink stage (Table 2), acephate did not perform differently from permethrin, but both were significantly better than methomyl. Methomyl was not significantly different from the untreated check. Similar results were found between treatments 2, 6, and 10 at petal fall. The permethrin treatment provided better aphid control, resulting in fewer curled leaves than methomyl or acephate.

In treatments 1 – 4 (Table 2), methomyl was applied at four different stages of host development. The latest application (first cover) resulted in the lowest number of aphid colonies per tree, but the next to the highest number of curled leaf clusters per tree. While methomyl may be effective in controlling currently present aphids, many infestations occurred prior to the first cover application. However, earlier applications of methomyl 1.8L (shuck fall, petal fall, and pink) resulted in a progressively higher number of aphid colonies per tree. This may be due to the reinfestation of treated trees after the degradation of spray residue. Because methomyl 1.8L has residual effect of about one week on plant surfaces (10), two applications of this chemical may likely be necessary to protect trees from reinfestation throughout the period of vulnerability.

Acephate (treatments 5 –8, Table 2) provided the best overall control of aphids when applied at the pink stage of development. Application at first cover was also effective in reducing the number of live aphid colonies. Similar results were found for permethrin (treatments 9 – 12), which provided a better overall control than methomyl or acephate.

From 1980 to 1984, GPA were susceptible to methomyl and acephate at the rate of 0.23 and 0.38 lb ai/100 gal respectively (3, 5, 10, 12). In this study, possible development of a pesticide resistant insect population is suggested because of their lower effectiveness (lower mortality) on GPA compared to earlier studies. Further work is necessary to determine if resistance is present, and if other factors, such as reinfestation after the degradation of chemical residues, contributes to poor control.

Table 2. Green peach aphid (GPA) chemical control timing study (1985). 1 C = First cover stage, P = Pink stage, PF = Petal fall stage, and SF = Shuck fall stage.

No. Treatment[a] (stage)	Rate per 100 gal (lb.ai)	Mean no. colonies per tree	No. curled leaf clusters per tree[b]	GPA Total means
1. methomyl 1.8 L (P)	16.0 oz (0.23)	9.6 ab	5.4 bc	15.0 abc
2. methomyl 1.8 L (PF)	16.0 oz (0.23)	7.4 b	15.4 a	22.8 ab
3. methomyl 1.8 L (SF)	16.0 oz (0.23)	5.6 bc	6.4 abc	12.0 bcd
4. methomyl 1.8 L (1C)	16.0 oz (0.23)	1.0 de	9.8 abc	10.8 bcd
5. acephate 75 SP (P)	8.0 oz (0.38)	1.0 de	0.0 e	1.0 f
6. acephate 75 SP (PF)	8.0 oz (0.38)	7.8 b	5.8 bc	13.6 bcd
7. acephate 75 SP (SF)	8.0 oz (0.38)	3.6 bcd	3.2 cd	6.8 cde
8. acephate 75 SP (1C)	8.0 oz (0.38)	0.2 e	7.8 ab	8.0 bcd
9. permethrin 3.2 EC (P)	2.0 oz (0.05)	1.8 cde	0.2 de	2.0 ef
10. permethrin 3.2 EC (PF)	2.0oz (0.05)	2.4 cde	2.4 cd	4.8 def
11. permethrin 3.2 EC (SF)	2.0 oz (0.05)	3.6 bcd	3.0 bc	6.0 cde
12. permethrin 3.2 EC (1C)	2.0 oz (0.05)	0.2 e	5.0 bc	5.2 def
13. Check	Unsprayed	25.8a	14.8a	40.6 a

a. For each treatment, any two numbers in the same column followed by the same letter are not significantly different as determined by Duncan's multile range test at the 5% level. Data were transformed to $\log_{10}(x + 1)$ for analysis.

b. No aphids were present.

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الملخص

كعكة، وليد وهنري هوغماير. 1991 . حياتية منّ الدراق الأخضر ومكافحته على اشجار الدراق في غرب فرجينيا بالولايات المتحدة. مجلة وقاية النبات العربية 9 (2) : 124 - 128.

أجريت في مزرعة جامعة فرجينيا، خلال عامي 1985/84 دراسة عن حياتية منّ الدراق الأخضر (Homoptera: Aphididae) *Myzus persicae* (Sulzer) ومكافحته. أمضت الحشرة فترة بياتها الشتوي على هيئة بالغات على العوائل الثانوية (الأعشاب)، داخل البساتين أو على حوافها. واكتشفت أعداد قليلة من المنّ على العائل الرئيس (الدراق peach) بعد سقوط البتلات بفترة قصيرة، ووصل تعداد الجيل الأول ذروته بعد مرحلة سقوط القشرة بأسبوع واحد، وعقب ذلك بأسبوعين انخفض التعداد بشكل سريع وهجر المنّ أشجار الدراق إلى العوائل الثانية (الخس البري الشوكي Prickly lettuce)، عصا الذهب Golden rod المهلك ذو القمة البيضاء White-top fleabanes ، والهندباء البرية Dandelion . وقد اختبرت كفاءة بعض المبيدات المسجلة وغير المسجلة لمكافحة هذه الآفة تحت الظروف الحقلية، ووجد أن كفاءة

برمثيرين (بارنس) وفلوفالينيت (سبور)، ومات 5927 كانت عالية عند مرحلة سقوط البتلات. هذا وظهرت اختلافات في فعالية ميثوميل (لانيت)، وأسيفيت (أوريثين)، وبرمثرين عند مراحل متعددة من تطور العائل الرئيس. وبشكل عام، يعتبر مبيد البرميثرين احد أكثر المبيدات كفاءة في مكافحة منّ الدراق الأخضر.

كلمات مفتاحية: المنّ، الدرّاق، مكافحة كيميائية، *Myzus persicae*.

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