scaffolds

Update on Pest Management and Crop Development

F R U I T J O U R N A L

May 12, 2008 VOLUME 17, No. 8 Geneva, NY

INSECTS

EH, WHAT'S UP, BUGS?

ORCHARD RADAR DIGEST

Geneva Predictions:

Roundheaded Appletree Borer

RAB adult emergence begins: May 30; Peak emergence: June 14.

RAB egglaying begins: June 9. Peak egglaying period roughly: June 29 to July 13.

Codling Moth

1st generation, first sustained trap catch biofix date: May 16

Codling moth development as of May 12: 1st generation adult emergence at 0% and 1st generation egg hatch at 0%

1st generation 3% CM egg hatch: June 10 (= target date for first spray where multiple sprays needed to control 1st generation CM).

1st generation 20% CM egg hatch: June 17 (= target date where one spray needed to control 1st generation codling moth).

Lesser Appleworm

1st LAW flight, 1st trap catch: May 8.

Mullein Plant Bug

Expected 50% egg hatch date: May 13, which is 10 days before rough estimate of Red Delicious petal fall date.

The most accurate time for limb tapping counts, but possibly after MPB damage has occurred, is when 90% of eggs have hatched.

90% egg hatch date: May 19.

Obliquebanded Leafroller

1st generation OBLR flight, first trap catch expected: June 10.

Oriental Fruit Moth

1st generation second treatment date, if needed: May 28.

San Jose Scale

First adult SJS caught on trap: May 17.

Spotted Tentiform Leafminer

1st STLM flight, peak trap catch: May 8.

1st generation sapfeeding mines start showing: May 20.

Optimum sample date is around May 22, when a larger portion of the mines have become detectable.

White Apple Leafhopper

1st generation WALH found on apple foliage: May 12.

IN THIS ISSUE...

SEE-SAW FLIES

THE PETALS DON'T FALL FAR FROM THE TREE
(Art Agnello, Entomology, Geneva)

❖❖ This has already been a complex season for tree development, with many ups and downs in temperature trends and bud growth, so the state's plantings are at a variety of stages ranging from full pink to past petal fall or shuck split. All of this complicates an already challenging process of attending to the arthropod control requirements at this time of year. The relative cool-down we're currently seeing gives just a bit of breathing room for considering some of the more significant pest management decisions to keep in mind.

Plum Curculio

Adults move into orchards from overwintering sites in hedgerows or the edges of woods and adults are active when temperatures exceed 60°F. Adult females oviposit in fruit during both day and night but feed mostly at night. Depending on temperature, overwintering adults remain active for 2–6 weeks after petal fall. Because adults are not highly mobile, orchards near overwintering sites, woodlands, and hedgerows are most susceptible to attack. Fruit damage is usually most common in border rows next to sites where adults overwinter. Although initial post-bloom sprays for plum curculio control should begin at petal fall, growers are often unsure how many additional sprays will be necessary to maintain protective chemical residues to prevent subsequent damage throughout the PC oviposition cycle, which varies according to temperatures and weather patterns after petal fall.

Following from the fact that PC activity and oviposition are largely determined by temperature, we use an oviposition model to determine when control sprays after petal fall are no longer necessary to protect fruit from PC damage. This model is based on the assumption that residues from control sprays after petal fall need to be maintained on fruit and foliage only until PC adults stop immigrating into orchards, which corresponds to the time when about 40% of the oviposition cycle is complete. This is predicted by the model to occur at 308 DD (base 50°F) after petal fall of McIntosh. Most probably, this strategy works because, after 40% of PC oviposition is complete, adults usually are not moving into the orchard from outside sources, or moving around within orchards from tree to tree. Therefore, by this time, adults residing in treated trees have already been killed by insecticide residues and are unable to complete the remainder of their normal oviposition cycle.

In order to use this strategy: (1) Treat the entire orchard at petal fall with a broad spectrum insecticide. (2) Start calculating the accumulation of DD after petal fall of Macs (base 50°F). (3) No additional sprays are necessary whenever the date of accumulation of 308 DD falls within 10–14 days after a previous spray. We'll attempt to give local updates for the major fruit areas as the post-PF period progresses. In cherries and other stone fruits that are already at shuck fall, sprays should start (or should have started, as appropriate) at the first

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opportunity. Recall that, in addition to previously labeled products, some recent registration decisions have resulted in some additional choices you may want to consider this season: Lorsban 75WG can be used at petal fall in apples (as well as tart cherries), Calypso is effective for plum curculio in apples and pears, and Avaunt is now labeled in stone fruit as another PC option.

Bear in mind that, owing to the warmer temperatures we saw in late April, PC adults (and for that matter, also European apple sawfly, below) are likely to be in most orchards already and waiting for the appearance of suitable fruitlets to attack. This will underscore the importance of timely petal fall applications, which may be more complicated in mixed variety plantings.

European Apple Sawfly

This primitive bee and wasp relative shows a preference for early or long-blooming varieties with a heavy set of fruit. This insect is generally a pest mainly in eastern N.Y., although it has been gradually making its presence known in the more western sites, progressing as far as Wayne Co. (or beyond), The adult sawfly emerges about the time apple trees come into bloom and lays eggs in the apple blossoms. Young larvae begin feeding just below the skin of the fruits, creating a spiral path usually around the calyx end. This early larval feeding will persist as a scar that is very visible at harvest. Following this feeding, the larva usually begins tunneling toward the seed cavity of the fruit or an adjacent fruit, which usually causes it to abort. As the larva feeds internally, it enlarges its exit hole, which is made highly conspicuous by a mass of wet, reddish-brown frass. The frass may drip onto adjacent fruits and leaves, giving them an unsightly appearance. The secondary feeding activity of a single sawfly larva can injure all the fruit in a cluster, causing stress on that fruit to abort during the traditional "June drop" period.

Certain insecticides that control these pests also adversely affect bees, which can pose a problem at petal fall because certain apple varieties lose their petals before others. In blocks of trees where petal fall has occurred on one variety but not the others, the variety that has lost its petals is likely to sustain some curculio or sawfly injury until the insecticide is applied. Some recently registered insecticides with activity against both plum curculio and sawfly -- Calypso, Avaunt and Actara -- may have a slight advantage over conventional OPs in this case. Another recently registered product, Assail, gives yet another option for controlling sawfly; it's not very active against plum curculio, but will do a good job against rosy apple aphid and spotted tentiform leafminer, as well as sawfly, at this timing. To minimize the hazard to honey bees, apply any pesticide only when no bees are actively foraging on blooming weeds (evening is better than early morning).

Mites

If you applied oil or a miticide during our ample prebloom mite control window this season, you're in good shape. If not, and you are concerned about early buildup in certain problem blocks, Agri-Mek, Apollo, Savey/Onager and Zeal are all appropriate choices to consider at petal fall. Because of the cool temperatures (particulary at night) that can still occur, nymphal populations are likely to be small enough to be effectively handled by any one of these materials, if they fit into your product rotation schedule (i.e., if they weren't used last year).

Obliquebanded Leafroller

Because these insects overwintered as 1st or 2nd stage larvae, they may have taken advantage of some of our earlier warm weather to feed and grow into good-sized caterpillars, although I have to say that most seen up to this point are still relatively tiny. It would be prudent to have a quick look for late-stage larvae in problem blocks to determine whether a treatment against the overwintered brood should be included in your petal fall plans. Scout the blossom clusters or foliar terminals for larvae feeding within both the flowers and rolled leaves; a 3% infestation rate could justify an application to minimize overwintered fruit damage and help reduce summer populations.

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Among the selective insecticides available, Intrepid has been successful at this timing, and B.t. products, which can be used while blossoms are still present, include Dipel, Deliver, Agree, Biobit and Javelin. More recently, Proclaim has been shown to be very effective at the petal fall timing, and also provides activity against early season mite populations. Pyrethroids such as Asana, Baythroid, Danitol, Warrior, Proaxis or Leverage may also be effective, depending on past use history, but be aware of their broad-spectrum effects, which can work both for and against you, according to how many beneficial mites and insects you can afford to lose. Also recall that Lorsban 75WG is registered for use in apples (and tart cherries) at petal fall, and populations may be susceptible to this a.i. as a good rotational option. Spintor, a very good OBLR material, may also be elected, although we have gotten best results season-long by reserving this product for the summer broods.

Oriental Fruit Moth

Biofix was significantly spread out in western NY, spanning the period from April 22 to May 2, and trap numbers, although healthy, are probably idling a bit until the temperatures warm again. Current degree day (base 45°F) readings total somewhere between: 42 (Appleton - North); 92 (Albion); 105 (Guilderland – Albany Co.); 145 (Sodus); 153 (Williamson); 205 (Highland) towards the recommended totals of 170 (in peaches) and 350 (in apples) as the timing at which to start a protective spray program. To maximize the efficacy of 1st brood control, peach growers in western N.Y. should use one of the suggested OP or pyrethroid options from the Recommends starting at petal fall, backed up 10–14 days later. In apples, a number of the petal fall selection of insecticides will do an acceptable job of controlling this generation, including the OPs, pyrethroids, Intrepid, Assail, and Calypso.

White Apple Leafhopper

We haven't spotted any yet, but WALH nymphs can be numerous in some blocks at petal fall, especially in the eastern part of the state. Nymphal populations of 1 or more per leaf can result in stippling damage to the leaves. Provado, Actara, Avaunt, Assail and Calypso have proven to be effective against this pest, and a petal fall application of any of these materials also gives leafminer control. Rosy apple aphids can similarly be cleaned up with this strategy (for most of the above; not so well with Avaunt), although petal fall is often too late to prevent fruit damage that their feeding may have caused. Growers using Sevin in their thinning sprays will get some WALH control at the 1 lb rate. Alternative choices include Thionex and Lannate; Agri-Mek or Carzol used for mites now will also do the job, although Carzol will be harmful to predator mites. ❖❖

PEST FOCUS

Geneva:
Codling moth and **lesser appleworm** 1st catch today, 5/12. **Spotted tentiform leafminer** and **redbanded leafroller** trap catches increasing. **Mullein plant bug** hatch began 5/6.

Highland:
Pear psylla nymphs above threshold on Bartlett pear
Obliquebanded leafroller larvae observed feeding

THE LONG & SHORT OF IT

WHAT ABOUT THOSE LEPS?? THE SHORT ANSWER... WE NO LONGER HAVE A SHORT ANSWER

(Peter Jentsch, Entomology, Highland)

❖❖ You probably have the bases covered for plum curculio (PC) and European apple sawfly (EAS) for your insecticide choices in post bloom applications. But what about those Leps? Many of the older insecticides (chlorinated hydrocarbons, organophosphates, carbamates, pyrethroids) act against the adult stage for the plum curculio, apple maggot, and Lepidoptera complex. They are also effective against the immature stages of leafrollers, internal worms and leafhoppers. But if you're transitioning away from the older materials for petal fall, 1st and 2nd cover applications, you'll need to be sure the leps don't slip through the cracks.

Many of the newer classes of insecticides control PC and EAS, and have greater species specificity. Some have less contact activity and residual effectiveness, while many are more effective against the egg or early larval stages. Many of these are 'Reduced Risk', considered safer to workers and 'soft' on beneficial insects. But how effective are they at controlling worms? Avaunt, widely used as an OP replacement at PF and 1st cover for EAS and PC will also manage the 1st generation internal worm complex, but gives little control of the overwintering obliquebanded leafroller (OBLR) larvae.

In regards to the lepidopteran complex, some of the organophosphates we continue to employ are active against the adult and larvae of the internal worm and leafroller complex. A common practice in the 'good old days' was to aim contact insecticides at the adults in the evening while they were active. In the Hudson Valley, the flight of codling moth begins near petal fall, with larval hatch beginning about two weeks later. Lorsban 75WG applied at petal fall has been shown to reduce the early emerging codling moth adults (Fig. 1) while 1st cover OP insecticides have traditionally managed the first generation larva (Fig. 2). Yet resistance to azinphos-methyl may be present in western NY. The internal worm complex has been observed in some processing blocks and subsequent rejections by processors will require the use of more effective Lepidoptera management practices. Also, resistance to azinphos-methyl by OBLR is prevalent throughout much of the state, including the Hudson Valley.

Fig. 1 - Codling moth adult

Fig. 2 - Codling moth larva and entry site with frass

To de-mystify the different modes of action of some of these new insecticides in managing Lepidoptera, we'll examine how they differ. Insecticidal modes of action include adulticides, effective against the adult stage. Ovicides are effective against the lepidopteran egg. They must be applied prior to the egg being laid so that it is deposited on

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the insecticide residue, or it must be applied over top of the egg after being deposited, depending on the material. Larvicides are effective against the larvae. Some larvicides work by direct contact, or by ingestion, which the larvae need to feed on for the material to be effective. Some larvicides are insect growth regulators (IGRs), acting through contact or ingestion. Some IGRs also have ovicidal activity, some act only on the early larval stage, while others act only on the late larvae stage. Timing is everything.

The use of traditional IPM scouting to determine the onset of egg laying or early larval hatch is difficult at best. For many of these insecticides to be effective, insect developmental models are employed to determine when each stage of insect development occurs during the growing season. For each insect species, a specific minimum temperature is required before development begins; this is called the base temperature. The codling moth begins development when temperatures reach and exceed 50°F, while the oriental fruit moth develops at a base temperature of 45°F and the obliquebanded leafroller at base 43°F. The accumulated thermal units (the daily average temperatures above the base temperature) are called degree days. By observing the accumulated degree days at each base temperature, we can 'follow' the development of different insect species. For some insects, we use a calendar date 'biofix' to begin degree day accumulations, while other models use the first sustained catch of the adult as a biofix. For OFM, many use a calendar biofix for the 1st generation, while the 2nd and 3rd generations involve the use of the adult sustained catch biofix for the model.

Information pertaining to managing lepidopteran populations based on degree day model predictions for New York can be found in weekly Scaffolds publications, on the Lake Ontario Fruit Lepidopteran Pest Trap Network for WNY and the Hudson Valley Regional Fruit Program web site.

Lepidopteran populations in the middle of the season are managed prior to being able to practically make an assessment of the damage potential. These 'prophylactic' applications, such as those made at egg laying or first hatch, are unavoidable, given the mode of action of these newer insecticides. Seasonal scouting of orchards should always be conducted to evaluate the timing and efficacy of insecticide applications based on predictive developmental models. The use of an unsprayed sentinel tree along the edge of your orchard can act as an important aid in determining the degree of damage you would have experienced had you not made preventive insecticide applications. A forensic evaluation of the sentinel fruit during the season and at harvest (if there is any) may provide useful information with regard to seasonal insect populations. This data may also help in justifying insecticide use to markets requiring validation.

The ovicides Rimon (not registered in NY) and Esteem, need to be applied as the first eggs are laid, such as for the codling moth and pear psylla eggs. CM often lays eggs directly onto the fruit (Fig. 3) and upon hatching feed directly in the fruit. Subsequently, timing of these materials is critical. Esteem will also work well against the later OBLR instars. It must be consumed to be effective as an insect growth regulator, and will inhibit larval molting into the adult stage.

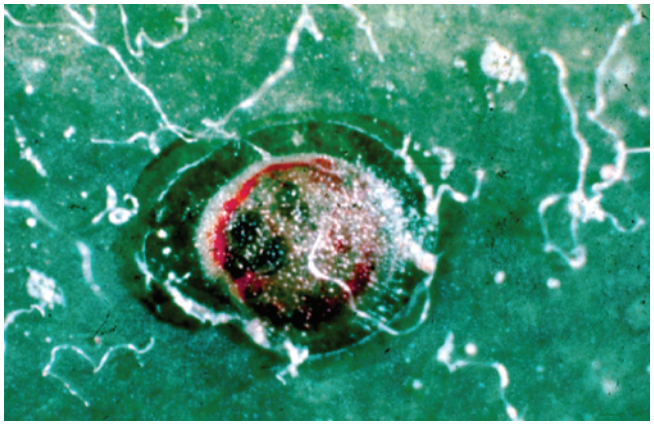

Fig. 3 - Codling moth egg

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The Bts such as Dipel are more effective at managing OBLR at low doses applied at 5–7-day intervals. In some years, the OBLR larvae (Fig. 4)

Fig. 4 - Overwintering OBLR larvae in terminal tip (5/9/08)

spend significant time feeding on foliage, allowing the Bts to be taken up through feeding rather than by direct contact. They too should be timed at the early larval hatch timing, and may require three applications to cover egg hatch completely. They should be timed for warm temperatures and dry weather to maximize residual and feeding. The Bts are not effective against the codling moth, as this insect often burrows directly into fruit, expelling the first few bites of the skin as they enter.

Lepidopteran management using chloronicotinyls and IGRs requires them to be applied at 10–14-day intervals beginning at first hatch. Chloronicotinyls (Provado, Calypso, Actara, Assail) have varying degrees of efficacy against Lepidoptera. In general they have less mortality against adult leps than against the larvae. Provado has shown only low to moderate toxicity to codling moth in laboratory studies and provides very little suppression of fruit injury. Actara has little or no efficacy against the Lepidopteran complex but is an excellent plum curculio material. Assail is quite good against the CM, OFM, LAW complex, but not strong against the leafrollers or plum curculio. Use of a non-ionic surfactant is recommended with Assail. Calypso, a very effective OP replacement, has lepidopteran activity, primarily limited to codling moth with excellent broad-spectrum activity, including plum curculio and European apple sawfly. The use of these materials for Codling Moth management of the 1st generation is typically achieved during the 1st cover application. A first spray date for the 2nd generation would be applied at 1260 DD (base 50°F) from the 1st catch of the season.

Resistance management strategies recommend that growers limit the number of chloronicotinyl applications in a season. For example, the inclusion of Calypso in a program that is already using Provado, Actara or Assail should be limited so as to reduce the resistance potential of this important class of insecticides.

Intrepid (methoxyfenozide), an IGR, acts to inhibit codling moth and leafroller larval molting, causing them to die within the cuticle that cannot be shed. It also has strong codling moth ovicidal activity, whether applied topically or if the eggs are laid on residues. It has little or no contact activity and must be ingested by larvae to have a toxic effect. In some cases, Intrepid will not kill the larva, but the subsequent adult will not be able to reproduce. Intrepid is effective against the CM/OFM/LAW, as well as OBLR and other leafrollers. Applications made against OBLR should be applied from bloom to 1st cover when temperatures exceed 65°F, followed by three days of dry weather, to ensure feeding uptake. If properly timed, it should manage overwintering OBLR and the 1st generation internal lep complex. The excellent residual activity of Intrepid should not be influenced dramatically by weather fluctuations, such as we experience with Bt products. Intrepid can also be used in a resistance management rotational program against leafroller larvae in the summer at early hatch.

Proclaim, (emamectin benzoate) is a similar chemistry to Agri-Mek and is effective against the Lepidopteran complex, with some miticidal activity. It should be applied at egg hatch and may

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be followed up with a second application in 7–14 days. In both laboratory bioassays and field studies, Proclaim was extremely toxic to obliquebanded Leafroller. In laboratory bioassays conducted in Washington State, Proclaim demonstrated a high level of toxicity to codling moth neonate larvae. However, it does not appear to be fast-acting, as treated larvae are able to enter the fruit and feed before dying. In field trials, delayed mortality was observed with only moderate suppression of fruit injury, yet most of the larvae that entered the fruit later died, resulting in a very high level of activity on codling moth larvae (95% reduction of live larvae). Field-aged residue tests showed moderate to high level of activity over 21 days.

SpinTor (spinosad) has shown excellent efficacy against OBLR when used at early hatch followed by 1–2 successive applications to cover newly hatching larvae of the summer brood. Dow recently modified the active ingredient to produce a new product, Delegate (spinetoram), slated for NYS registration in late 2008, which has a greater spectrum of activity than SpinTor, with greater efficacy, residual life and weathering capacity. It is effective out to 21 days. Using the degree day model for obliquebanded Leafroller, Spintor would be applied at first hatch, at approximately 325 DD (base 43°F) from the first sustained catch of adults (Fig. 5).

Fig. 5. - OBLR adult

To close, the days of simply putting an OP in the tank in season-long applications for insect pest management are nearing an end. OP resistance in some insects, and changing use patterns and regulations are moving insect pest managers toward the use of diverse classes of new insecticides with narrower spectrums of activity. However, these novel modes of action will undoubtedly give us better control of certain insect pests than we've seen in the past three decades, with less impact on farmworkers and the orchard ecosystem if we learn how to use them effectively. ❖❖

A SHARED INTEREST

TOWER AND SENSORS FIELD DEMONSTRATIONS (Andrew Landers, Entomology, Geneva)

❖❖ There will be two demonstrations that will showcase equipment that was purchased through a USDA Conservation Innovation Grant. The purpose of this grant was to bring a new concept or technology to an area that will reduce environmental impact and increase profitability for agriculture producers. Ten farmers received cost-share to purchase ten new sprayers in 2007. The District is hoping this program will lead to more cost–share opportunities in the future for farmers to purchase conservation type equipment.

• May 29, 2008 at 2:30 pm at Joe Heberle's Farm, Lakeshore Road, Town of Kendall

• June 10, 2008 at 10:00 am, Lynn Oaken Farms, Alps Road, Town of Yates

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GENERAL INFO

continued...

Heberle Farm

Oakes Farm

JUST A CLICK AWAY

❖❖ The online version of the 2008 Pest Management Guidelines for Commercial Tree-Fruit Production is now available at: http://ipmguidelines.org/treefruits/.We apologize for the delay in getting this posted; the system isn't quite as effortless yet as we hope it will be someday. ❖❖

PHENOLOGIES

Geneva:

	5/12	5/19 (Predicted)
Apple(McIntosh):	50% petal fall	fruit set
Apple(Red Delicious):	bloom	petal fall
Apple(Empire):	50% petal fall	petal fall
Pear(Bartlett):	90% petal fall	fruit set
Sweet cherry(Hedelfingen):	fruit set, shucks off	
Tart cherry(Montmorency):	fruit set, shucks on	
Plum (Stanley):	fruit set, shucks on	
Peach:	fruit set, shucks on	

Highland:
Apple (Ginger Gold): petal fall
Apple (McIntosh): 80% petal fall
Apple (Red Delicious): 50% petal fall
Apple (Golden Delicious): 30% petal fall
Pear (Bartlett, Bosc): petal fall – fruit 5mm
Peach (early, late): fruit set, shucks on
Plum (Italian, Stanley): fruit set
Sweet cherry: petal – fruit set, shucks off

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva, NY

	5/5	5/8	5/12
Green fruitworm	0.0	0.2	0.0
Redbanded leafroller	15.8	10.3	5.6
Spotted tentiform leafminer	3.3	23.3	11.6
Oriental fruit moth	0.6	7.0	1.0
American plum borer	0.0	0.0	0.0
Lesser peachtree borer	–	–	0.0
Lesser appleworm	0.0	0.0	0.0

Highland, NY

	4/28	5/5
Green fruitworm	0.0	0.0
Redbanded leafroller	1.0	1.5
Spotted tentiform leafminer	10.9	29.3
Oriental fruit moth	2.5	2.6
Codling moth	0.0	0.1*
Lesser appleworm	0.0	0.4*

* first catch

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–5/12/08):	440	233
(Geneva 1/1–5/12/2007):	374	188
(Geneva "Normal"):	432	239
(Geneva 1/1–5/19 Predicted):	526	278
(Highland 3/1–5/12/08):	428	203

Coming Events:	Ranges (Normal ±StDev):	
Spotted tentiform leafminer sap-feeders present	343–601	165–317
European red mite 1st summer eggs	447–555	237–309
Oriental fruit moth 1st flight peak	332–538	161–287
American plum borer 1st catch	331–525	143–279
Lesser appleworm 1st catch	257–573	116–304
Codling moth 1st catch	389–609	191–335
Green fruitworm flight subsides	233–453	100–236
San Jose scale 1st catch	381–605	189–325
Mirid bugs 50% hatch	407–523	203–281
Plum curculio oviposition scars present	485–589	256–310
Pear psylla hardshell present	493–643	271–361
McIntosh at petal fall	445–525	227–281

NOTE: Every effort has been made to provide correct, complete and up-to-date pesticide recommendations. Nevertheless, changes in pesticide regulations occur constantly, and human errors are possible. These recommendations are not a substitute for pesticide labelling. Please read the label before applying any pesticide.

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