

Eradicoat survey analysis

Centre County, PA - March 2009

Summary

A voluntary study was conducted through the internet on homeowners' experiences with Eradicoat in the 2008 gypsy moth outbreak in Centre County, PA. The small sample size (31 respondents) and the wide diversity of responses limited the number of distinct conclusions which could be drawn from the study. However, when the responses of the respondents who were satisfied with the product were compared with the responses of those who were not satisfied with the product's performance, some differences in the way they had used Eradicoat emerged and are described in the next paragraph.

Early application of Eradicoat, before caterpillar emergence, was critical. Also, Eradicoat performed better on isolated trees and rows of trees rather than trees growing in a densely forested situation. When using burlap, better results were obtained when it was folded into a flap once the caterpillars had matured past the 4th stage. Following these practices will likely result in a much improved performance of Eradicoat.

Introduction

Eradicoat was introduced in Centre County in 2008 during the multi-county gypsy moth infestation in Central PA. Promising results from an independent USDA study and user testimonials publicized by the manufacturer made it appear like a product worth considering for homeowner use in Centre County. The company made a major effort to publicize the product and made its representative, Mr. Pat Canfora, available to give presentations at the three gypsy moth Public Meetings organized by the county's gypsy moth coordinator.

Many homeowners bought the product and used it under many different circumstances, and one municipality, State College Borough, used the product to protect the trees on a number of its streets. As the county gypsy moth coordinator, I heard a wide range of opinions about the product's effectiveness. In order to try and get at the underlying reality, I organized a voluntary online questionnaire that dealt with users' experiences with Eradicoat. The study was publicized by an article in the Gypsy Moth News (the county's eNewsletter informing residents about the gypsy moth situation) which has a recipient list of approximately 1,700 county residents.

This report summarizes the findings in that study. Please note that because of the small sample size and the voluntary sampling method used, the findings presented in this report should be treated as a broad impression of Eradicoat and do not represent a statistically validated study.

Results

Grouping

There was a total of 31 respondents to the survey. All respondents were asked to rate Eradicoat on a scale of 5 to 1 where 5 was 'extremely satisfied' and 1 was 'not at all satisfied'. Of 31 responses to the survey, 17 were satisfied (*7 rated it as '5' and 10 rated it as '4'*). 9 were not satisfied (*7 rated it as '2' and 2 rated it as '1'*), with the remaining 5 being in the middle category.

In order to differentiate between the satisfied and dissatisfied users, respondents were divided into two groups – the satisfied users (hereafter called Sats), who rated Eradicoat as a '5' or '4' and the dissatisfied users (hereafter called Disats) who rated Eradicoat as a '2' or '1'. The responses of the middle group ('3') were only used in general questions.

Tree Layouts:

Respondents were asked to describe their 'tree layouts' i.e. how their trees were distributed in their treatment areas, varying from individual isolated trees to a full forest canopy. Eradicoat is not intended to be used in forest situations with overlapping canopies. Realistically, only aerial application can work under such conditions. Here were the four choices available:

1. Standalone trees with no or negligible canopy overlap
2. Tree row with some canopy overlap
3. Forest: Widely spaced trees with some canopy overlap
4. Forest: Densely spaced trees with considerable overlapped canopies

Of the 17 Sats, most of them (76%) were standalone or in a row. The remaining 24% were forested users (3 were densely-spaced and 1 widely-spaced). Of the 9 Disats, 4 (44%) had trees that were standalone or in a row, while the remaining 5 (56%) were densely-spaced in a forest environment. The Disats group had a larger proportion of their trees in a forest environment, when poorer performance from Eradicoat would be expected.

When used in a stand of densely spaced trees, the proportion of trees that were treated showed a very wide range from 1% – 50% for the Sats and 1% - 80% of the Disats, although there was no clear difference in the proportion of trees that were treated between the two groups. (A 1% value means that only 1 out 100 trees were banded.)

Practically all the applications were made on species highly favored by gypsy moths.

The Sats had an average tree height of 51 ft and Disats 76 ft, although the mean diameters hardly differed (23 vs 25 inches). Neither was there any difference between the average amounts used per project between the two groups (around 3 qts).

The total number of trees the Disats (23) banded was on average double that of the Sats (12).

Timing

Eradicoat works when caterpillars crawl over the sprayed surface and acquire a toxic dose of permethrin (the insecticide used in the product). Smaller caterpillars require a much lower dose to kill them and because of the slower speed of crawling, need only to go a small distance on the treated area before they succumb to the insecticide and die. Larger caterpillars need a higher dose which takes a longer time to acquire. That is one reason why the company recommends that the burlap is folded over when the caterpillars are past their 4th stage. In their mature stage, they tend to hide from predators during the daytime, and while resting on the treated burlap, there is adequate time for them to acquire a toxic dose and die.

It is apparent that the best time to kill caterpillars is when they are very small and are searching for foliage. Their instinctive behavior is to climb vertical surfaces until they find leaves. So if the Eradicoat has been applied in bands around the tree (either onto burlap or the bark itself) during the dispersion phase, when the tiny caterpillars get blown by the wind on silk threads, it is likely to be most effective. In contrast, once the caterpillars are in the tree canopy, they are not likely to descend down the tree trunk for several weeks, and sometimes remain in the canopy throughout all their larval stages. Caterpillars can get into the tree canopy following their dispersion, or they may already be present in the form of egg masses that were laid there the year before.

Clearly timing is critical, especially if the tree does not have any egg masses on it. Because Eradicoat is resistant to deactivation, there is no penalty in applying it a week or two before the caterpillars emerge. In Centre County this would be during the first week in April.

The survey results would indicate that a large majority of the Sats (88%) applied Eradicoat before (56%) or during (32%) the dispersion. Contrast this with the Disats, where only 44% of the users applied the product before or during dispersion. Although there is a wide variation in the data obtained in this survey, it is this finding that may be the critical one that affected the efficacy of the product.

Miscellaneous Findings

Folding the Burlap

It may be significant that 60% of the Sats folded over their burlaps (so that the larger caterpillars can get an increased dose of insecticide while resting under burlap), whereas only 33% of the Disats did.

Shaking the Bottle

The Eradicoat Company emphasizes the importance of shaking the bottle before spraying to ensure that the pesticide is fully dispersed in the mixture. It seemed that both groups almost universally shook the bottle before spraying.

In 2009, Eradicoat is recommending that users spray the product directly onto the tree bark, instead of the burlap band. The survey revealed that 18% of the Sats and 33% of the Disats applied Eradicoat to the bark and not to the burlap wrapping. Note however that this study hints that better efficacy may be obtained if a fold is made in the burlap to deal with the harder-to-kill later stages.

Ease of Application

About half the respondents considered that applying Eradicoat was easy and another 35% thought it was okay. The remaining 22% thought the process difficult. Five respondents voluntarily stated in the comments section that clogging of the nozzle had occurred. There had been no question on this subject in the survey, but the volunteered complaints and subsequent accounts I heard clearly made this a very real problem with the product in 2008.

Observations

It is reassuring to find obvious signs that a product is working well. Respondents were asked whether they had seen dead caterpillars on the burlap and at the foot of the tree. Many (82%) had seen them on the burlap and 52% at the tree base. As the caterpillars matured, respondents saw fewer larger dead caterpillars ($\frac{1}{4}$ " 55%, $\frac{1}{2}$ " 55%, 1" 36%, $1\frac{1}{2}$ " 15%, $>1\frac{1}{2}$ " 15%).

About one quarter of respondents saw caterpillars cross the burlap bands without being killed. Only about 10% saw $\frac{1}{4}$ " live caterpillars on burlap but as they grew older, more seemed to survive (40% saw live 1" caterpillars and 30% saw live $1\frac{1}{2}$ " caterpillars).

When users observe an effect of some agent – in this case a pesticide with a novel method of treatment – it is normal to wonder if the effect that you're seeing is a direct result of the agent or would it have occurred without their action. In gypsy moth-affected areas, it is usually possible to compare treated and untreated trees or areas. Respondents were asked about the levels of defoliation they had observed in treated and untreated trees. They were also asked if aerial application had occurred on the banded trees.

The Sats reported that the banded trees showed an average of 12% defoliation (median 10%, min 0% max 20%). The Disats reported 51% defoliation (median 40%, min 10%, max 100%). There was clearly a difference between the two groups! When these figures are compared with the defoliation in the surrounding trees, the Sats had a mean of 40% defoliation (median 40%, min 10%, Max 100%), whereas the Disats had a mean of 64% (median 70%, min 40%, max 100%), suggesting that the Disats were using Eradicoat under more challenging conditions.

Regarding other simultaneous treatments, a surprisingly high 35% of the Sats were treated aerially and 22% of the Disats. There is usually little doubt that aerial application, with its unique access to most parts of the forest canopy and its almost universal efficacy in the 2008 gypsy moth season, trumps local ground applied techniques. The fact that so large a proportion of the respondents were treated aerially (which nearly always happens while the caterpillars are relatively small and haven't done match damage to the canopy), would throw doubt on some of the findings in this study.

Conclusions

As stated in the introduction, the small sample size and self-selection of respondents make it somewhat difficult to draw firm conclusions from this survey. However, it would seem that certain user practices served to improve the efficacy of the product. Several conclusions can be drawn from the study:

1. Apply Eradicoat early - before the general emergence of caterpillars from egg masses.
2. Apply mainly to isolated trees, or trees arranged in rows. If applying to densely spaced trees, do not expect miracles! The product will have little effect on trees in a forest with overlapping tree canopies.
3. If trees already have substantial egg mass numbers, understand that it is highly unlikely that the caterpillars will come into contact with the treated burlap or bark before some degree of defoliation has occurred on the trees.
4. If using burlap, fold it over when caterpillars are sufficiently large (4th stage) to encourage the chances that they will receive a toxic dose.

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