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BRAVO CORRECTION

In a previous article I stated that the only formulation of Bravo permitted for use on upright dieback (pre-bloom) was Bravo 720. In fact Bravo Weather Stik has superseded Bravo 720, and you may use Bravo Weather Stik. Both products have EPA registration number 50534-188 and in the eyes of EPA, the products are the same. To use either product, you need the 24C Special Local Needs label, available from your ag products dealer or the state department of agriculture (WDATCP; 608-224-4542).

FUNGINEX AND ORBIT

Existing stocks of Funginex may be used for cottonball control, but you must have the 24c Special Local Needs label on hand (same label as in previous years). **Orbit (propiconazole)** has again received a Section 18 Emergency registration, effective April 15-July 31, 1998. In order to use Orbit, you must have the **NEW** Section 18 Emergency Exemption label. See the last newsletter or call the WSCGA office for a copy.

Patty McManus, UW-Madison, Plant Pathology

It is almost a definition of a gentleman to say that he is one who never inflicts pain.

John Henry Newman

MINICLINICS PLANNED

Cranberry miniclinics will be held on Wednesday May 27 and Thursday May 29, 1998. On May 27 we will meet at 10:00 am at the Tamarack Flowage Cranberry Co. near Three Lakes. To get to the marsh go south on CTY A from Three Lakes. The marsh is on the east side of CTY A about 1 ½ miles south of Three Lakes.

On Thursday May 28 we will meet at the Buena Vista Cranberry Co east of Wisconsin Rapids at 1:30 p.m. Buena Vista Cranberry Co. is located on the northwest corner of CTY F and Quarry Road. The easiest way to get there is by going north from Hwy 73 or south from Hwy 54. Quarry Road is about 10 miles south of Hwy 54 and about 4 miles north of Hwy 73.

Miniclinics are informal gatherings where growers and Extension faculty can meet to discuss problems, challenges and opportunities. The discussion will be led by Drs. Dan Mahr (entomology), Patty McManus (Plant Pathology), and Teryl Roper (Horticulture). Please plan to come to share ideas and information.

The world has achieved brilliance without wisdom, power without conscience. Ours is a world of nuclear giants and ethical infants

Omar Bradley

SAFETY SEMINAR FOR SUMMER YOUTH HELP PLANNED

An afternoon seminar for summer youth employees on cranberry marshes will be held on Wednesday June 17 from 2:00 to 4:00 p.m. at Lake Dexter County Park. The agenda for the day is:

2:00	Check in
2:15	Introductions and instructions
2:20	Begin seminars
	✓ *Large Equipment Safety*
	✓ *Small Equipment Safety*
	✓ *Environmental Safety*
2:50	Switch groups
3:25	Switch groups
3:55	Refreshments

Lake Dexter County Park is located north of Hwy 54 about ¾ of a mile west of Hwy 80 on the west shore of Lake Dexter. We will meet in the pavilion at the park. A brochure with a map was mailed to all cranberry marshes. In order to plan sufficient materials and refreshments we ask that you call the WSCGA office (715-423-2070) and let them know how many youth from your operation will attend. This safety seminar is sponsored by the University of Wisconsin-Extension and the Wisconsin State Cranberry Growers Association.

Editors note: The following article was provided by Dr. Rod Macfarlane who conducted bumble bee research in Wisconsin in 1995 with funding from the Wisconsin Cranberry Board and the Cranberry Institute. Part of the article is printed here and the remainder will be included in the next issue. Dr. Macfarlane has provided two additional articles that will run in later editions.

MANAGEMENT FOR BUMBLE BEES: FIELD HIVE TRIALS AND COLONY ENEMIES IN CRANBERRY AREAS

Rod. P. Macfarlane, *Buzzuniversal*

Summary

Bumble bee use of field hives was poor in 1995, except for one site. To ensure full occupation in a typical season hives should be out in the field by 20-25 April in central Wisconsin and the start of May in N. Wisconsin. The economics of making hives compared with the purchase of commercially reared colonies is often unfavorable. The odd exception may occur in central Wisconsin, where there is a good bumble bee population supported by a favorable sequence of food supply before the cranberries flower.

Populations of natural enemies of bumble bees were often favorable. There were few cuckoo bumble bees. Entry of reared colonies by the bumble bee wax moth was late enough in the season to allow for new queens to be "reclaimed" from the colonies.

INTRODUCTION

A 1995 survey of bumble bees on 18 flowering cranberry marshes showed the main species in Wisconsin to be *B. impatiens, B. terricola* and *B. griseocollis. B. ternarius, B. vagans, B. affinis* and *B. perplexus* were of minor importance. The most important species and those with the largest colonies are the underground nesting species *B. impatiens, B. terricola* and perhaps *B. ternarius* (Macfarlane 1974, Macfarlane *et al* 1994). *B. griseocollis* is mainly a surface nesting species with relatively small colonies averaging only

88 bees per colony throughout the season (Macfarlane 1974). A summary has been presented of the main food supply sources for these bumble bees in Wisconsin (Macfarlane & Patten 1998).

Potential enemies of bumble bees were reviewed for cranberry growers (Macfarlane 1995). This paper summarizes initial trials with field hives for resident bumble bee populations and observations on natural enemies in reared colonies in the field.

Methods

In all 162 hives were tested in 13 areas. Hives were made of wood. Most had an overlapping lid covered with metal or the wooden box was painted. If possible sites with some food sources (mainly raspberry, blackberry) nearby along the margin of woods that were not poorly drained were chosen. Hives at unsuccessful marshes had a poor sequence of food supplies for the bumble bees with huckle berry, choke cherries or winterberry among the prominent mid spring flower sources. In retrospect, few better sites were apparent at the central Wisconsin marsh sites surveyed for foraging bumble bees.

1995 was a poor season for colony formation for the early emerging *B. terricola, B. ternarius, B. bimaculatus* in central Wisconsin based on the ratio of workers to queens. More workers were recorded in Northern Wisconsin. A possible reason for the difference in rearing success between the regions was an early spring thaw followed by frosts in central Wisconsin. The frosts may have killed most of the lowbush blueberry flowers and its berry formation was certainly poor.

Natural enemies and depradators were recovered from *Bombus impatiens* colonies sent to six Wisconsin growers in 1994.

Field hives use and trial potential

At Fanning cranberry marsh, bumble bee queens occupied 14 % of the hives. This area had dandelions next to it and later on raspberries. Perhaps some early nesting was missed, as most hives were not all put out until early May. However, by then only the Fanning site any close by flower food source. Otherwise use of field hives was at poor (less than 5 % occupied) at 11 of the 13 sites.

Surface hives were used at twice (6 %) the rate of underground hives (3%).

Table 1 Bumble bee colony initiation in field hives at central Wisconsin cranberry marshes

Marsh	Hives tested			Number of hives occupied by queens		
	Surface	Under ground	Areas tested (#)	Short tongued species	Long tongued species	Unknown species
Fanning	32	32	3	3	1	1
Brockman	15	15	2	0	1	1
Walker	12	10	2	0	0	0
Other cranmoor	8	8	2	0	0	1
Gebhardt (Warrens)	30	0	3	0	0	0
Total	**96**	**65**	**14**	**3**	**2**	**3**

B. rufocinctus accounted for all the colonies that produced workers and for all the known short tongued species of bumble bees (Table 1). This was despite *B. rufocinctus* being ranked last in abundance in central Wisconsin from among 2765 bumble bees in 1995. In southern Alberta (Hobbs 1965, Richards 1978) and north Wisconsin (Fye and Medler 1954) *B. rufocinctus* was a major colonizer of bumble bee hives. Hence, *B. rufocinctus* is apparently less particular about the nest sites it occupies than most other bumble bee species in North America. The potential for economic use is small, because of the relatively small colonies (Hobbs 1965, Macfarlane *et al* 1994).

A single queen of long tongued *B. fervidus* and *B. pennsylvanicus* were the only other species identified as starting colonies. Three more colonies were started, but the queens did not rear pupae, so they were not identified to species. Only 43 % of the colonies started actually produced workers, which is poor compared with the 60 % achieved overall for three species in mainly rural places in New Zealand. Hence even in the better sites of central Wisconsin the indication is that founding queen survival is low. This may well be related mainly to a poor sequence of food supplies.

The use of sugar feeders before queens occupied the hives was tested in half the hives at Fannings. No colonies were formed in the hives with extra feeders and feeders encouraged at least two species of ants to invade the hives (especially underground). Hence any use of feeders should be applied to hives with colonies already been started.

Field hives placed for colony initiation by feral queens have very limited potential use at most Wisconsin marshes mainly due to a quite limited extent unless food supplies. Where food supplies area improved then some trails with field hives may be merited and where the more favorable habitats for bumble bees harbor the highest populations around cranberry bogs. A further major shortcoming of any colony formed from a queen occupying a hive in central and even more so in northern Wisconsin is that the colonies will still be small (less than 50 workers) and growing by the time cranberry flowering peaks based on work done on their life cycle around central Wisconsin marshes.

The opportunity cost of investment and trial of field hives in much of Wisconsin is poor as long as the prices of reared colonies remain around $90 each. Field hive materials for bumble bees cost $10 to $15 even if labor is discounted, but they could last 15 or more years if treated timber is used. Annual replacement of lining cost $0.5 per year too. Users really need 30-50 % of the hives with viable colonies to maintain profitability and continued interest in colony management. Hence any testing of hives should be restricted to a few sites and then only where there is a reasonable sequence of flower sources or in sites where there seem to be considerable populations from year to year. Advice on hive design remains as presented at the 1995 Wisconsin school (Macfarlane 1995).

In years or places with better food supplies better results should be obtained based on results with poorer hives used in Northern Wisconsin (Fye and Medler 1954). Hive use in Wisconsin was poorer than in Washington (Macfarlane *et al.* 1994) despite more water and draft proof hives being used in Wisconsin. Overall in the Washington and Wisconsin cranberry growing areas occupation of field hives

by bumble bee queens has often been very poor compared with much more favorable results along the margin of the Rocky mountains in southern Alberta (Hobbs 1967, Richards 1978). Hence the provisional conclusion that food supplies need to receive much more attention ahead of nest sites as suspected (Macfarlane 1995) has proved to be true.

1995 was a near record cool late spring during late March and April. Growers saw queens in the Warrens area toward the end of April and the derived start to nesting in 1995 showed of the first queens must have been active 10 or so days before the first ones were identified on May 6. The two aerial and surface nesting *B. bimaculatus* and *B. perplexus* started nesting sooner than the underground nesting *B. terricola* and *B. ternarius* in central Wisconsin (Table 2) and southern Ontario (Liu 1973, Macfarlane 1974) even although *B. terricola* and *B. ternarius* tend to emerge up to 5 days sooner than *B. bimaculatus* and *B. perplexus* (Macfarlane 1974). In southern Ontario yearly fluctuations in average queen emergence of early emerging species (*B. terricola, B. bimaculatus, B. perplexus*) was 11-16 days, but only 5-7 days for mid season species (*B. impatiens, B. vagans, B. affinis*) (Macfarlane 1974). The start of nesting can be expected to vary to a similar extent in central Wisconsin. Nesting for any particular species extends for 4-6 weeks (Richards 1978 Macfarlane *et al.* 1994) and full ovarian development for all the queens takes 3-4 weeks (Macfarlane 1974).

In central Wisconsin, it is recommended that hives should be in the field 20-25 April before willow, Norway maple and leatherleaf reach full flowering. In Northern Wisconsin hives should probably be out by the start of May. This should obtain all nesting by the main cranberry pollinating bumble bees in a normal season.

Table 2 1995 start of appearance of queens, nesting and males in central to north Wisconsin

Species	Queen first seen	nesting started *	worker first seen
B. bimaculatus	6 May	1-15 May	22 May
B. perplexus	6 May	3-15 May	25 May
B. terricola	6 May	7-22 May	3 June
B. ternarius	6 May	14-20 May	14 June
B. impatiens	6 May	22-24 May	14 June
B. vagans	6 May	16-25 May	*14 June*
B. affinis	6 May	29 May	19 June
B. griseocollis	22 May	21-22 May	*11 June*
P. ashtoni	7 May	29 May	none

* Based on first pollen collection, nest searching and derived from average development time (22 days from egg to worker).

To be continued

Calendar of Events

Mini-clinics

May 27 10:00 am Tamarack Flowage Cranberry Co., Three Lakes
May 28 1:30 pm Buena Vista Cranberry Co., East of Wisc. Rapids

Youth Worker Safety Seminar

June 17 2-4 pm Lake Dexter County Park, Dexterville, Call 715-423-2070 to indicate the number attending

Cranberry Summer Field Day

Aug 5 Potter Cranberry Company, Warrens

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