FATE OF PESTICIDES IN THE ENVIRONMENT

The fate of a pesticide in the environment begins with its initial distribution and continues through its subsequent movement and persistence in each component of the environment. Distribution may begin when you apply a pesticide to the target area. Studies have shown that a significant percentage of pesticides never reach the intended site of application because of drift, volatility, or misapplication.

A pesticide can move from the target area in a variety of ways. It may:

- Volatilize from plant or soil surfaces,
- Be moved by wind or water from treated foliage to the soil,
- Be carried laterally by surface water runoff or through soil erosion,
- Be incorporated into the soil with crop residues,
- Be taken from the site as residue on transplants or harvested fruit, or
- Leach through the soil.

Eventually, a large portion of many pesticides we apply ends up in the soil. If the soil does not have a chance to break down pesticides before it leaches through the soil profile or is washed away on the soil surface, the pesticides we apply may ultimately contaminate surface waters or groundwater.

Many factors determine the extent of pollution which is likely to result from the use of a given pesticide. Pesticides vary in their degree of attachment or *adsorption* to soil particles. Those which are strongly adsorbed are less likely to be carried from the treated area by surface water or to leach through the soil into the groundwater; they may, however, be moved readily by soil erosion. Pesticides also vary in their degree of water *solubility*; obviously, those with greater solubility have a greater potential for both movement and water contamination. The *volatility* of a pesticide is a measure of its tendency to turn into a vapor. Pesticides with greater volatility dissipate more rapidly and pose less risk of soil and/or water pollution.

An often-critical factor in determining the extent of pollution is the rate of *degradation* or breakdown of the pesticide; pesticides vary substantially in their susceptibility to degradation. Degradation may be chemical, physical, biological, or any combination of the three. Biological breakdown of a pesticide results from attack by fungi, bacteria, and other microorganisms. While most degradation of pesticides occurs in the soil, breakdown also may occur in water or on soil or plant surfaces. Biological activity in the soil and its subsequent effect on the rate of pesticide degradation depend upon adequate soil moisture and temperature.

When a pesticide is degraded, it is changed chemically; it is usually, but not always, broken down into nontoxic compounds. All pesticides, including the chlorinated hydrocarbons, are subject to degradation; only the rate of degradation varies. Although some pesticides may remain in the environment for years, none will remain forever. Once degradation has proceeded to a sufficient extent, most pesticides are no longer active and pose no further risks of pollution.

We frequently refer to the persistence of a pesticide. *Persistence* is simply a measure of how long a pesticide remains in an active form at the site of application or in the environment. Persistence is a function of a pesticide's adsorption, solubility, volatility, and susceptibility to degradation. Persistence may be either desirable or undesirable. Where the objective is long-term control, a persistent pesticide with residual activity may be desirable; persistence and residual activity are often used interchangeably. Persistence beyond the time it is needed, however, is often undesirable and the remaining pesticide is usually referred to as residue.

Some persistent pesticides can accumulate in the bodies of animals (including humans), particularly in fat tissue. This process is referred to as *bioaccumulation*. Those pesticides which do accumulate in animal tissue may sometimes reach harmful levels, especially in animals higher up in the food chain.

A *food chain* simply describes the sequence whereby an animal feeds on a particular plant, animal, or microorganism, is in turn eaten by another animal, and so forth until we reach the animal at the top of the chain. At each succeeding level, an animal normally eats a number of individuals from a "lower level." An accumulative pesticide can, therefore, become increasingly concentrated as it moves up the food chain; this process is referred to as *biomagnification*. A "higher level" animal can become poisoned without ever directly contacting the pesticide.

Biomagnification can begin when an animal eats a treated plant or a plant that has absorbed pesticides from contaminated soil or water. Biomagnification may be of particular significance in aquatic food chains. People are normally not affected directly by this process simply because we are usually protected by residue tolerances for the food products we consume. Fish and wildlife have no such protection and, of course, neither do people who fish or hunt.

Pollution of the environment can occur as a result of pesticide applications, but more frequently it occurs as a result of spills, accumulation of residues at mixing and loading sites, and improper storage and disposal.

From Pest Management Principles for the commercial applicator--Fruit Crops

No nation can remain free unless its people cherish their freedoms, understand the responsibilities they entail, and nurture the will to preserve them. Law is the strongest link between man and freedom.

John F. Kennedy

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FIELD NOTES

The cold weather in late August and early September has led to frost protection around the state. Historically, warmer air will replace the cold Canadian air leading to more typical temperatures. The cold weather has caused both fruit and vines to become red. Vines that are low in nitrogen show the red before vines with adequate N. Some beds are showing some upright dieback. The cause of upright dieback is not known.

BERRY ANALYSIS

Following is a four year comparison chart on numbers of fruit per square foot and the gram weight of each. In 1994, 352 square foot samples have been harvested throughout the Lady Bug Region. These counts are an attempt to forecast the crop for each grower and then summarized to compare with other growers of the same cultivar.

I am disappointed in the weight per fruit for 1994. However, we still have several weeks before harvest, and fruit will continue to size right up until harvest with favorable conditions.

Jayne Sojka, Lady Bug IPM

Lady Bug Integrated Pest Management

Crop Forecast Comparison

1991-1994 berry counts and weights.

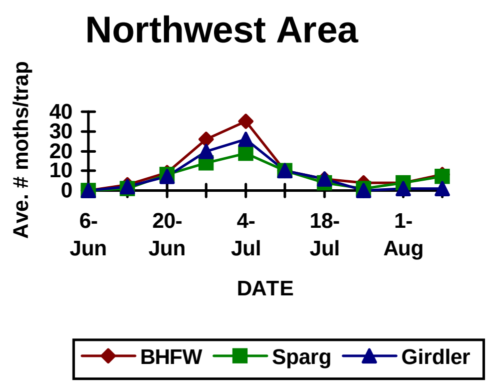
Cultivar	Mean fruit per sq. ft. (no.)	Range	Mean wt per berry (g)	Range	Mean wt. per sq. ft. (g)	Mean bbl per acre
1994	352 samples					
Stevens	182	146-328	1.05	0.88-1.22	191	184
Searles	192	147-224	0.91	0.76-1.17	175	168
Ben Lear	178	112-236	0.99	0.91-1.19	177	170
Crowley	147	133-276	0.67	0.59-0.71	98	95
McFarlin	207	156-257	0.73	0.6-0.94	151	145
Pilgrim	192	127-264	1.13	1.04-1.21	216	192
LeMunyon	191	133-276	1.07	1.01-1.23	197	204
1993	304 samples					
Stevens	120	57-252	1.18	0.92-1.57	139	134
Searles	106	38-161	0.93	0.65-1.21	100	96
Ben Lear	137	66-239	1.08	0.89-1.21	147	141
Crowley	86	42-121	0.99	0.76-1.24	84	81
McFarlin	109	27-174	0.83	0.69-1.17	86	83
LeMunyon	89	36-166	1.33	1.25-1.4	124	123
1992	196 samples					
Stevens	156	52-251	1.12	0.95-1.32	175	168
Searles	130	75-167	0.92	0.76-1.1	118	113
Ben Lear	137	101-199	0.97	0.83-1.17	133	128
Crowley	61	17-101	0.84	0.75-0.99	49	47
McFarlin	183	141-223	0.80	0.58-0.95	147	141
LeMunyon	112	23-200	1.2	1.06-1.3	134	129
1991	144 samples					
Stevens	153	67-219	1.38	1.05-1.63	213	205
Searles	138	85-238	1.13	0.89-1.28	158	152
Ben Lear	177	100-319	1.2	1.07-1.32	212	204
Crowley	173	99-200	1.0	0.88-1.18	173	166

McFarlin	134	97-157	1.13	1.06-1.24	153	147

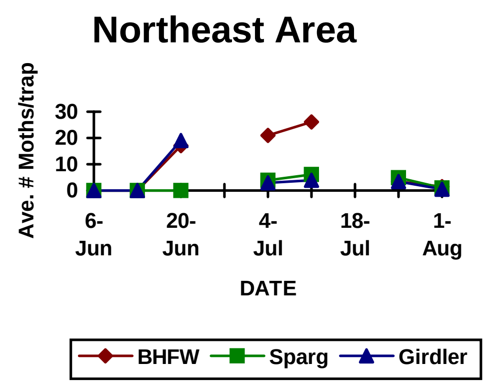
1994 Pheromone trap counts

Cranmoor area includes: Adams, Portage and Wood counties
Warrens area includes: Jackson, Juneau and Monroe counties
Northeast area includes: Forest, Lincoln, Oneida, Price, and Vilas counties
Northwest area includes: Barron, Burnett, Douglas, Rusk, Sawyer, and Washburn counties

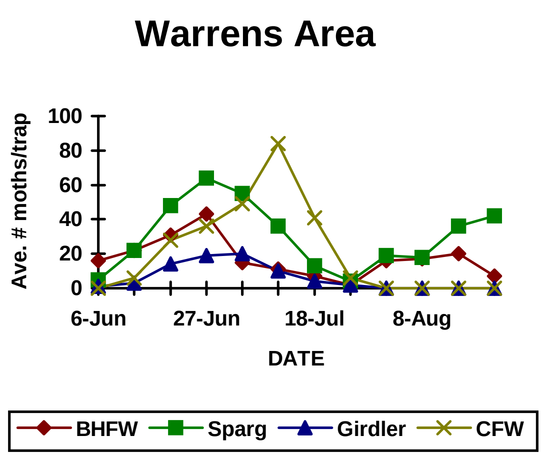
Please note that different regions may have different scales on the left axis. Doing this allows greater accuracy in determining actual values within a region. However, comparisons between regions are more difficult. Please use caution in making comparisons of these averages to trap counts on your marsh.



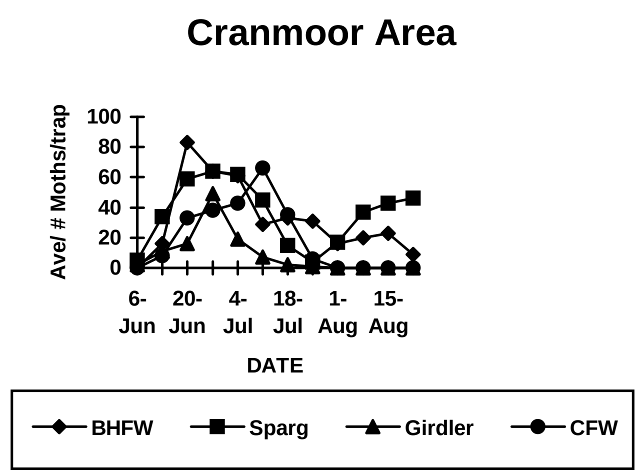
Means from 8 growers



Means from 2 growers



Means from 39 growers



Means from 29 growers

1994 Production Figures Compared

The National Agricultural Statistics Service of the USDA and the Cranberry Marketing Committee have released their respective 1994 cranberry crop estimates. The table below compares the two estimates and includes 1993 harvested acres for interpretation.

State	1994 USDA *Thousand barrels*	1994 CMC *Thousand barrels*	1993 Acres *harvested*
MA	1,930	1,925	13,100
NJ	440	490	3,400
OR	255	252	1,500
WA	158	160	1,400
WI	1,530	1,630	10,000

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