
APPENDIX C: GYPCHEK TECHNICAL BULLETIN

USDA Forest Service

January 1, 2009

TECHNICAL BULLETIN¹

GYPCHEK, BIOLOGICAL INSECTICIDE FOR THE GYPSY MOTH

Gypchek is a powder that consists of occlusion bodies (OBs) (polyhedra) of the gypsy moth nucleopolyhedrovirus and inert insect parts from the gypsy moth larvae in which the virus was produced. Care must be taken in the storage, mixing and application of the technical powder. The virus is very sensitive to sunlight and temperatures above 55° C (131°F) and the powder should be stored under cool conditions, preferably refrigeration, and in the dark prior to use. Temperatures below freezing are recommended for long-term storage. Since Gypchek is especially active against smaller larvae it is recommended that applications be made as soon as hatch is complete, all larvae have dispersed off the egg masses and are actively feeding, and the majority of larvae are in the late-first or early-second instar. Further, the majority of the target foliage, should be at least 20 percent expanded at the time of spray. The two tank-mixtures described below are for aerial application and should be applied in sufficient volume for thorough foliar coverage.

1. MIXING AND APPLICATION FOR AERIAL TREATMENTS

A spray adjuvant (Carrier 038-A, Omnova solutions, Inc., 803-377-2204) has been specifically developed for use with Gypchek. Carrier 038-A possesses sunlight-shielding and antievaporative properties superior to a lignosulfonate-molasses tank-mix that is also used with Gypchek. For suppression of gypsy moth populations and the protection of foliage in treatment areas where egg hatch is synchronous and most larvae are at the same stage of development, the current recommendation for the Carrier 038-A tank-mix is a single application of 400 billion (4×10^{11}) OBs in one-half to one gallon (U.S.) finished spray per acre. In treatment areas where hatch is not synchronous (e.g., along elevational gradients) two applications each of 200 billion (2×10^{11}) OBs, two to four days apart, in one-half to one gallon (U.S.) finished spray per acre per application is recommended. Similarly, for eradication projects either a single application of one trillion (1×10^{12}) OBs, or two applications of 500 billion (5×10^{11}) is recommended. For both operational suppression and eradication scenarios there are more data to support the use of one gallon of finished spray per acre.

The current recommendation for suppression using the lignosulfonate-molasses tank-mix is two applications, two to four days apart, at the rate of 200 billion OBs in two gallons (U.S.) of finished spray per acre for each application. For eradication the recommendation is two applications of 500 billion OBs per acre. Use hydraulic nozzle systems (e.g., flat fans with 8006 tips) or rotary atomizers (e.g., Micronair AU 5000) designed to result in a droplet $D_{v,5}$ (=VMD)² of 100 to 350 microns. It is recommended that applications be made under favorable weather conditions (winds <10 mph, relative humidity at least 50 percent, and temperatures below 80° F) which is usually early in the morning or early in the evening. Do not spray if rain is predicted within 12 hrs. of the planned application.

A. CARRIER 038-A TANK MIXTURE (PER GALLON)³

Gypchek	200-500 billion OBs
Carrier 038-A	0.94 gallon (120 fl. oz.)
Water	0.05 gallon (7 fl.oz)
Bond	0.01 gallon (1 fl. oz.)

The finished tank-mix should be prepared 95 parts Carrier 038-A, 1 part foliar adhesive and 5 parts Gypchek-water slurry (vol/vol). For example, a 5 gallon slurry of Gypchek would be used with 94 gallons of Carrier 038-A and 1 gallon of Bond (Loveland Industries) to treat 100 acres at one gallon per acre.

Important: Check the pH of water from a field source. If the pH exceeds 7.5 or is below 5.5, add sufficient acid or base to adjust⁴ the pH to approximately 7.0. **NEVER USE CHLORINATED WATER TO PREPARE THE GYPCHEK SLURRY.**

MIXING INSTRUCTIONS

1. For every 100 gallons of tank mix, add the appropriate amount of Gypchek to 5 gallons of water in a clean pail. Mix into a slurry until the powder is evenly dispersed and there are no clumps. Whenever practical, shield the powder from direct sunlight while preparing the slurry. **DO NOT ADD THE POWDER DIRECTLY TO THE TANK MIX IN THE AIRCRAFT HOPPER.**

2. Add the appropriate amount of Carrier 038-A to the mix tank and while circulating pour in the Gypchek-water slurry. Rinse the slurry pail(s) with a small amount of water and add the rinsate(s) to the tank. Continue to mix thoroughly for at least 5 minutes. Finally, add the Bond and continue to mix thoroughly for at least 10 minutes before loading the aircraft.

B. LIGNOSULFONATE-MOLASSES TANK MIXTURE (PER GALLON)

Gypchek	100-500 billion OBs
Sodium-lignosulfonate (powder)	0.5 lb.
Feed-grade molasses ⁵	0.13 gallon (16 fl.oz.)
Bond (Loveland Industries)	0.02 gallon (2.5 fl. oz.)
Water	0.85 gallon (110 fl. oz.)

MIXING INSTRUCTIONS

1. Fill the mix- tank with the amount of nonchlorinated water (pH 5.5-7.5)⁴ necessary for the desired acreage. While circulating, slowly add the necessary lignosulfonate powder.

2. When the lignosulfonate is in solution add the molasses and mix thoroughly for about 5 minutes. The lignosulfonate-molasses mix can stand overnight, perhaps two nights if cool.

3. Just before spray add the Gypchek and finally the Bond. The Gypchek powder should be added slowly to avoid clumping. Gypchek can also be added as a slurry described above. Circulate for 15-20 minutes and load as per aircraft specifications.

2. MIXING AND APPLICATION FOR GROUND TREATMENTS

The tank mixture below is for ground application using hydraulic equipment and should be applied in sufficient volume for thorough and uniform foliage coverage. For spraying roadsides, woodlots or small acreages, it is recommended that one application be made at the rate of 100 gallons (U.S.) finished spray per acre. For individual trees in homeowner situations it is recommended that trees be sprayed once to runoff (For example: 15-25 gallons per tree for large oaks).

LIGNOSULFONATE TANK MIXTURE (PER GALLON)

Gypchek	10 billion OBs
Sodium-lignosulfonate (powder)	0.5lbs
Water	0.98 gallon (125 fl.oz)
Bond	0.02 gallon (2.5 fl. oz.)

MIXING INSTRUCTIONS

1. Fill hydraulic sprayer tank mix with the amount of nonchlorinated water (pH 5.5-7.5)⁴ necessary for the desired acreage. While circulating, slowly add the necessary lignosulfonate powder. When the lignosulfonate is in solution, slowly add the Gypchek, either as the powder or as a slurry. Finally, add the Bond and circulate for 15-20 minutes before spraying. If the lignosulfonate is not used⁶, simply leave it out of the sequence of mixing ingredients.

¹Read label thoroughly before using and follow all cautions and directions. Immediately before application Gypchek is mixed with adjuvants that contain sulfite and/or sulfate derivatives. A small percentage of the human population is extremely sensitive to these products. Managers should notify both those involved with handling these products and those living in or near the treatment areas of the potential hazard so that sensitive individuals can take the appropriate steps to avoid potential adverse health effects.

²The droplet size that divides the spray volume in half; 50 percent of the droplets are above the D_{v50} and 50 percent are below.

³The addition of 1 percent Bond (vol/vol) may enhance the adhesive properties of Carrier 038-A.

⁴Use products that are available for adjusting the pH of swimming pool water.

⁵Use refined products that contain minimal amounts of plant material, *e.g.*, Mo-Mix (Southern States Cooperative), Triple Crown Pure Cane Molasses (Equine Specialty Feed Co.), or similar products.

⁶Ground-based hydraulic sprays without UV protectants have been found to be as efficacious as sprays containing UV protectants presumably because virus applied to the undersides of leaves is protected from direct sunlight and remains active long enough for larvae to acquire lethal doses.