



# Put an end to Vole Damage in your Orchards, Nursery Stock and Ornamentals with



## Use:

Ground Force with active ingredient Chlorophacinone (0.005%) is a anticoagulant rodenticide proven effective for over 30 years against voles and commensal rodents.

Ground Force pellets is a commercial product only to be used by certified pest control operators, farmers and persons authorized in government-approved pest control programs.

Formulated as a weather-resistant paraffinized pellet, Ground Force vole bait holds up to wet conditions before and after snow pack, reducing the chances of tree girdling, runway damage, and production losses from voles on your property.

## Chemical Name and Structure of Active Ingredient (a.i.): Chlorophacinone (CPN)

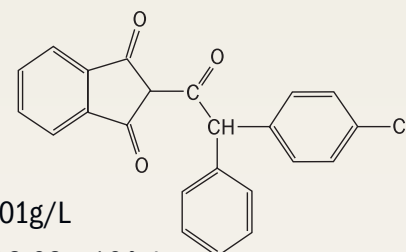
2-((2-(4-chlorophenyl)-1-oxo-2-phenyl) ethyl) -1H-indene-1,3-(2H)-dione

**Chemical Class:** indandione anticoagulant

**CAS Number:** 3691-35-8

**Water Solubility:** 0.013g/L at 20°C ( +/- 5)

pH 10 buffer: 0.459g/L, pH 7 buffer: 0.344g/L, pH 4 buffer: 0.001g/L



**Environmental Fate** (aerobic soil metabolism): Half-life is 23 days with a rate constant of  $3.03 \times 10^{-2}$  days.

In soil, 64% of CPN rapidly degraded to CO<sub>2</sub> within 70 days.

O-phthalic acid is a transitional product of the degradation.

## Ground Force Pellets

**% a.i.:** 0.005% or 50 ppm Chlorophacinone

**Bulk Density:** 44 lbs./cubic foot (0.71g/ml)

**Type/Appearance:** Beige, 3/16" diameter (4.7mm) pellet. Limited dust.  
Approximately 2,490 bait pellets per pound of product.



Item #84321

## Storage Recommendation:

Store in a tightly closed container in a cool, dry place inaccessible to children, pets, livestock and non-target animals.

5013-1B  
(2/9/17)



# Paraffinized Pellets with Chlorophacinone



# Vole Taxonomy & Behavior

**Overview:** (*Genus - Microtus*) there are 23 species of voles in the United States. Voles are frequently mistaken for shrews, field mice & deer mice. While similar, distinguishing characteristics include longer, coarser hair and a larger head size.

**Body:** Are small & stocky, pear-shaped, 4-7 inches long, with heads almost as big as their bodies. They have short legs & short tails. Meadow voles are slightly larger than pine voles and have longer tails.

**Color:** Adult meadow voles are chestnut brown, mixed with black, and their underparts are dark gray. Feet are brownish. Young are uniformly gray. Pine voles are more reddish-brown in color.

**Ears:** Ears are furred and do not project much above the hair.

**Eyes:** Eyes are small and black.

**Teeth:** Voles have round, blunted snouts (like a guinea pig's head), and their front teeth are chisel-shaped. An easy way to distinguish them from shrews, is that shrews are smaller and have long pointed snouts pointed front teeth, similar to moles.

**Tail:** Short, dark on the upper surface, changing to a lighter gray underneath. An easy way to distinguish a vole from a mouse, is that a mouse's tail extends much longer, generally to half their body length, while a vole's is under 2 inches long, less than twice the length of its hind foot.

**Droppings:** Brown or green in color and shaped like rice grains.



*Meadow vole*



*Pine vole*

## Geographic Range:



## Habitat:

Orchards, pastures, stream & pond banks, rock walls, and fence rows, pastures & hay fields, lawns, gardens, and nurseries provide suitable habitat for pine & meadow voles. Voles are semifossorial, constructing many tunnels and surface runways with numerous burrow entrances. Vole nests are globular structures of dry grass, about 6-8 inches in diameter and may contain several adults and young. Pine voles remain almost entirely underground building extensive tunnel systems and pushing conical piles of soil to the surface. In areas where snow cover is present, they typically create surface runways under snow during winter.

## Behavior:

Voles are active day & night, year-round, with peak activity occurring at dawn & dusk. They do not hibernate. Their home range is generally 1¼ acre or less, but this varies with season, population density, habitat, and food supply. Large population fluctuations are characteristic of voles, with peaks every 2 to 5 years. In a warm, wet year an abundance of thick vegetation provides plentiful food source, and provides cover, allowing the voles populations to spike to as high as 400 voles per acre. Girdling damage marks are typically irregular with marks about 1/8" wide, and 3/8" long. In contrast, rabbit damage is more uniform and wider.

## Reproductive Cycle:

Become sexually mature and able to mate in as little as 3-6 weeks. Peak breeding is spring through early fall (March-October), but may occur year round during mild weather.

Voles average 1-5 litters per year; most with at least two. Gestation periods are about 20 to 24 days, and litters average 3 to 6 pups, but may range from 1 to as high as 11 pups. Therefore, as single female vole may produce from 3 to 50 offspring annually.

The normal life expectancy is short, 2-16 months.

Female voles can breed again immediately after delivering their young, producing a new litter as often as every 4 weeks.

## Food Preferences:

Voles eat a wide variety of plants, primarily grasses & forbs during summer and fall they store seeds, tubers, bulbs & rhizomes. They will also eat grain crops, as well as eat bark, cambium and tree roots at times, primarily during fall & winter.

## Inspection:

If you find runways immediately after snow melt, that are approximately 1½ inches wide, usually near areas of cover and fencerows; or if you find small burrows with conical piles there is a good chance voles are present. The [apple indexing method](#) is a way to determine the distribution and relative abundance of voles throughout an orchard. Place apple slices on active runways or the entrance to burrows, weighing the apples in advance, and partially covering the apples with a loose pail or shingle. Re-inspect the apples 24 hours later for tooth marks and weigh the apples again for consumption. Meadow voles consume 20g in 24 hours, while Pine voles less, about 13g. Monitoring vole numbers will advise growers if populations are increasing or decreasing, and if a particular treatment has made an impact reducing a population.

## Habitat Modification & Exclusion:

Repeated mowing of areas near orchards and tree plantations (etc.) to a height of 3-6 inches, will serve to limit both food and cover, exposing voles to predators.

If wire guards are attempted, these should be made of at least 1/4 inch hardware cloth, and 18-24" tall (at least 12 inches above the peak snow height), and, buried at least 4 inches deep, to prevent voles from getting over or burrowing underneath. Tree guards should allow for 5 years of growth in girth to avoid the need for premature replacement, as this can be extremely labor intensive and expensive.

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