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(54) **Titre :** METHODE D'UTILISATION DE N-HYDROXY-1,4-NAPHTHALENEDIONE COMME HERBICIDE NOVATEUR
(54) **Title:** METHOD OF USING N-HYDROXY-1,4-NAPHTHALENEDIONE AS A NOVEL HERBICIDE

(57) **Abrégé/Abstract:**

The Invention relates to an herbicide formulation comprising of N-hydroxy-1,4- naphthalenedione mixed with an adjuvant and water and where the herbicide formulation is used against the buckthorn family (Rhamnaceae) and other weeds.



ABSTRACT

The Invention relates to an ***herbicide formulation*** comprising of N-hydroxy-1,4-naphthalenedione mixed with an adjuvant and water and where the herbicide formulation is used against the buckthorn family (Rhamnaceae) and other weeds.

DESCRIPTION

FIELD OF THE INVENTION

The present invention refers to herbicides, and particularly to herbicides that affect plants that are intolerant to 5-hydroxy-1,4-naphthalenedione, and more particularly to plants of the buckthorn family (Rhamnaceae) and other weeds.

SUMMARY OF THE INVENTION

Due to increased human incursion into previously untouched ecosystems, a host of invasive weeds has become entrenched in places where they have no natural effective competition, and whereby they threaten to destabilize or destroy the ecological system. Case in point- glossy and European buckthorn (*Frangula alnus* and *Rhamnus cathartica*) are aggressive, noxious shrubs that dominate remediation and disturbed sites, are aggressive seeders that shut out succession of other trees in the understory, and alter the soil chemistry of places in which they have dominated to further impede the ability of native species to survive. These invasive shrubs were originally brought in from Europe and have now aggressively spread throughout eastern United States and eastern Canada.

Current forestry, restoration and agriculture practices for controlling buckthorn require utilizing mechanical techniques such as cutting and chipping trees and then applying herbicides such as triclopyr or glyphosate to the cut stumps. Buckthorn will often re-sprout despite the direct application of these herbicides, and its seeds can remain dormant in the soil for up to 5 years.

Observation of black walnut (*Juglans nigra*) trees along farm fences, as well as walnut groves along woodland edges showed an absence of buckthorn in areas where buckthorn should be in significant concentration, and high concentrations of buckthorn being near but not under the direct drip line of the black walnut. Furthermore, there was evidence of dead mature buckthorn trees at the edge of the drip line of vigorously growing walnut that indicate the walnut has a post-emergent effect on mature Buckthorn shrubs. This is an important observation, if the buckthorn can be controlled with spray, as opposed to with mechanical means, and further, that the spray is effective to pre-emergent seeds and post-emergent seedlings and mature shrubs.

Field trials have been started (March 2016) to examine the effects of different herbicide concentrations, adjuvant type and concentrations, and application techniques in order to optimize performance.

Furthermore, an herbicide formulation based on 5-hydroxy-1,4-naphthalenedione is a naturally occurring substance, with known toxicity, soil migration (limited), and persistence. While it demonstrates toxicity to various other plants, microorganisms, insects and animals (including humans) nonetheless there are

many native plant and animal species that have adapted to 5-hydroxy-1,4-naphthalenedione.

OBJECTIVES OF THE INVENTION

The objectives of the invention are to control pre-emergent and post-emergent buckthorn (Rhamnaceae) family invasive weeds by means of the herbicide formulation 5-hydroxy-1,4-naphthalenedione.

One other objective is to test this formulation against other invasive species that may have the same reaction to the herbicide as the buckthorn.

In addition, a further objective to explore is the potential of the chemical 5-hydroxy-1,4-naphthalenedione to be used as an insecticide on trees which have developed resistance to the chemical to eradicate an infestation. Specifically, ash trees infested with emerald ash borer (*Agrilus planipennis*) would be tested.

Lastly, one other objective is to, after confirming field testing against the various weeds, to improve the herbicide formulation for better performance.

SUMMARY OF THE INVENTION

The above objectives are achieved by means of the **herbicide formulation** 5-hydroxy-1,4-naphthalenedione with appropriate adjuvants and water and application techniques.

5-hydroxy-1,4-naphthalenedione may work by inhibiting mitosis, changing the mitotic phase index of cells in prophase, and decreasing meristematic activity in root tips, and inhibiting mitochondrial membrane potential. Effects specifically on Rhamnaceae will be the objects of further study during the trial periods of the **herbicide formulation**.

CLAIMS

1. Where the herbicide N-hydroxy-1,4-naphthalenedione where N is in the range of 2-5.
2. Where the herbicide formation is 5-hydroxy-1,4-naphthalenedione.
3. The herbicide may be provided in liquid or solid form and is created by dissolving the **herbicide formulation** in an appropriate adjuvant and water.
4. Where the **herbicide formulation** is used to suppress or kill the buckthorn family (Rhamnaceae) and other weeds.