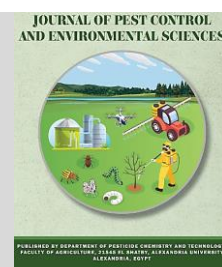


Available online at <https://jpces.journals.ekb.eg/>

Journal of Pest Control and Environmental Sciences (JPCES)

Volume 25 (2025) 11–13



Short Communication

Modern, environmentally safe applications for controlling tree pests: Tree injection as friendly environmental technique

Mohamed A. Al-Eryan

Department of Applied Entomology and Zoology, Faculty of Agriculture, Alexandria University, El-Shatby, Alexandria, Egypt.

ABSTRACT

Chemicals are applied to trees for many reasons such as insecticides repel or kill damaging insects. chemical is more effective when placed inside the tree. Tree injection are alternative methods of applying chemicals to trees that can be more efficient and targeted. The systemic insecticides imidacloprid and emamectin benzoate are available and labeled for soil drenching and/or soil or trunk injection. In a nursery of ornamental trees. Trees were treated through soil drench with imidacloprid 35% solution at rate of three ml concentrated insecticide/tree aged three years. After 2 months from the treatment, the canopy was recovered. New leaves were emerged from buds on the live parts of the tree. The outstanding Trunk injection technique was applied to control Red Palm Weevil, *Rhynchophorus ferrugineus* infesting ornamental palms in landscapes. Imidacloprid 35% was used at rate 2 ml concentrated insecticide/length meter of the palm. Recovery of palm canopy was observed after three months from injection and protection the palm extended three successive years.

Keywords: Tree injection; Ornamental trees and palms; imidacloprid; *Rhynchophorus ferrugineus*.

1. Introduction

1.1. Trunk injection

Chemicals are applied to trees for many reasons such as insects repel or kill damaging insects. Spraying is the most typical way to apply these chemicals. It fast uses readily available equipment. The down side of spraying is that much of the chemical being applied is wasted, either to drift, run off, or because it cannot be applied precisely to where it is needed in the tree. Also, in many cases the chemical is more effective when placed inside the tree, and this is difficult with spraying (Herrell, 2007, Michael, 2011). Tree injection are alternative methods of applying chemicals to trees that can be more efficient and targeted. These methods include trunk injection and Soil injection/drenching.

Trunk injection works by placing water soluble chemicals at or inside the cambium tissue. The chemicals then move into and through the tree mainly in the xylem sap. Injection tends to be good methods

for treating piercing-sucking insects such as aphids, mealy bugs and leafminers. This is because water evaporation from the leaves (transpiration) pulls water up from the soil through the vascular tissue in the stem (the transpiration stream) where the chemical is applied. Also, borers and bark beetles can be killed if chemical location and timing are just right.

By using systemic insecticides, it can be avoided or minimize some problems associated with spray application. New systemic insecticides and innovative delivery systems provide arborists with several choices. The systemic insecticides imidacloprid and emamectin benzoate are available and labeled for soil drenching and/or soil or trunk injection. Imidacloprid is a formulated for use in landscapes. This systemic chloronicotinyl insecticide controls a number of insect pests, including leaf beetle, leafminers, mealybugs and, soft scales, whiteflies, and beetle grubs (Gill et al., 1999). Takai et al. (2003) found that injection liquid emamectin benzoate protects tree from infestation with lepidopterous and coleopterous pests

* Corresponding author E-mail: m_a_aleryan@yahoo.com, Prof.Dr/mohamed.elerian@alexu.edu.eg

Received 6 November 2025; Received in revised form 17 November 2025; Accepted 18 November 2025. Available online 18 November 2025.

for 2 years and 3 years for pine wilt nematode. Also, emamectin benzoate was used to protect ash trees from Emerald Ash Borer, *Agrilus planipennis* (Smitley et al., 2010). Residual activity of injected imidacloprid and abamectin benzoate provides protection against insect pests that have extended emergence periods, multiple generations per year, or are epidemic (i.e., population outbreak) (Sangha and Machemer, 1992; and Suchail et al., 2001).

1.2. Using trunk injection to control Red Palm Weevil

Red Palm Weevil, *Rhynchophorus ferrugineus* (Coleoptera: Dryophthoridae) is an invasive destructive pest of different species of palms in Middle East countries and south Europe (Mazza et al. 2014). The larvae can bore in soft tissue of the palm; such as in the tree crown, upper part of the trunk and at the base of petioles. They can also bore into the trunk of young palms and the decaying tissue of dying palms (Al-Eryan et. al., 2013). The outstanding trunk injection technique was applied to control the weevil infesting ornamental palms, *Pritchardia* sp. in landscapes of Alexandria university hostel and faculty of agriculture (Figure 1). Imidacloprid 35% was used at rate 2 ml concentrated insecticide/length meter of the palm. Recovery of palm canopy was observed after three months from injection and protection extended for three successive years (Figure 1).

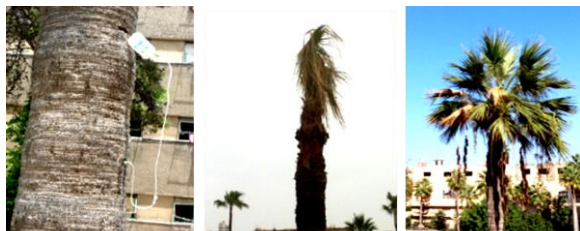


Figure 1. Injection ornamental palm, *Pritchardia* sp. by imidacloprid 35% and canopy recovery has extended for three years.

1.3. Soil drench

Soil injection or drench methods involve placing chemicals in liquid form near the roots in the soil for root uptake. Chemicals should be applied to moist but not saturated soil. This is used for application of imidacloprid. Amounts to be applied depend on trunk diameter (Michael, 2011). Recently, this method has been applied in vine trees for control of the mealy bugs.

With soil injection and drench methods the trees are not wounded but wanted higher amounts of insecticides must be used than with injection (though maybe less than with spraying) and there is more possibility for affecting non-target insects. The soil drench method uses almost no tools. Uptake may be

slower than with trunk injection, and it is even more important that the chemical be water soluble.

1.4. Using soil drench to control tree borers

In a nursery of ornamental trees lies in the desert road Alexandria – Cairo. Small trees aged three years, *Acacia galuca*, *Cordia* sp., *Kaya* sp., *Ponjamina* sp., and *Poinciana* sp. have been infested with insect borer, *Synoxylon* sp. (Coleoptera: Bostrichidae). Trees were treated through soil drench with imidacloprid 35% solution at rate of three ml concentrated insecticide/tree aged three years. After 2 months from treatment, the canopy was recovered. New leaves were emerged from buds on the live parts of the tree (Figure 2).



Figure 2. Infestation symptoms with tree borers and canopy recovery after soil injected by imidacloprid 35%.

2. Conclusion

Today, tree injection is an alternative method for minimize environmental risk of chemical application with definite, advantages: (1) efficient use of chemicals, (2) reduced potential environmental exposure on non-targets organisms. (3) practical when other treatments with insecticides are hard to be applied (Fernandez-Escobar, 2004). Injection is used when trees are at risk from attacking destructive or persistent pests. It may be put to good use in tall trees. Tree injection does create wounds, however the benefit of the introduced chemistry to protect trees often outweigh the drilling wound (Joseph et al., 2012). Tree injection is a method to deliver specific, toxicants to the injurious pest and to minimize non-intended exposures.

References

- Al-Eryan, M. A. S.; El-Ghariani, I. M.; Ismail, S. A.; Massry A.; Al-Taeib S. A.; Raheel S. (2013). Management protocol depending on pheromones and burning palms for the red palm weevil *Rhynchophorus ferrugineus* Oliv. (Coleoptera:Curculionidae) recently recorded in Libya. Entomology, Ornithology and Herpetology. 3: 119.

- Gill S.; Jefferson, D. K.; Reeser, R. M.; Raupp, M. J. (1999). Use of soil and trunk injection of systemic insecticides to control lace bug on hawthorn. *Arboriculture & Urban Forestry*. 25(1): 38-42.
- Harrell M. , (2007). Chapter 5 – Tree injections and implants. In: *IPM of Midwest Landscapes: Tactics and Tools for IPM Website*; pp. 32-34. Online at [/www.entomology.umn.edu/cues/web/032TreeInjectionsImplants.pdf](http://www.entomology.umn.edu/cues/web/032TreeInjectionsImplants.pdf)
- Joseph J. D.; Peter M. W. (2012). Tree injection as an alternative method of insecticide application, 61-78. In: *Insecticides - Basic and Other Applications*, Soloneski S. (Ed.), ISBN: 978-953-51-0007-2.
- Michael K. (2011). Getting chemicals into trees without spraying. *Urban Forestry*. NR/FF/020 (pr).
- Mazza G.; Francardi V.; Simoni S.; Benvenuti C.; Cervo R.; Faleiro J. R.; Roversi P. F. (2014). An overview on the natural enemies of *Rhynchophorus palm weevils*, with focus on *R. ferrugineus*. *Biological Control*. 77: 83-92.
- Sangha G.; Machemer L. (1992). An overview of the toxicology of NTN 33893 and its metabolites. Unpublished study prepared by Miles Inc. 134 p. In: *SERA (Syracuse Environmental Research Associates, Inc.). 2005. Imidacloprid – human health and ecological risk assessment – final report. SERA TR 05-43-24-03a. pp. 283.*
- Smitley D. R.; Doccia J. J.; Cox D. L. (2010). Multiple-year protection of ash trees from emerald ash borer with a single trunk injection of emamectin benzoate, and single year protection with an imidacloprid basal drench. *Arboriculture & Urban Forestry*. 36(5): 206–211.
- Suchail S.; Guez D.; Belzunces L.P. (2001). Discrepancy between acute and chronic toxicity induced by imidacloprid and its metabolites in *Apis mellifera*. *Environmental Toxicology and Chemistry*. 20(11): 2482–2486.
- Takai K.; Suzuki T.; Kawazu K. (2003). Distribution and persistence of emamectin benzoate at efficacious concentrations in pine tissues after injection of a liquid formulation. *Pest Management Science*. 60: 42-48.