

Mexican scientists design a new system to control the mistletoe

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Credit: Investigación y Desarrollo

Mistletoe comprises a group of plants unable to take water and nutrients

from the soil, so they have to absorb other plants for survival. These parasitic plants easily reproduce, and in some cases, even kill their hosts. They are therefore considered a major pest afflicting the world's forests. In the state of Veracruz, it is estimated that a large proportion of trees are affected by this plague, counting both forests and urban trees.

The Institute of Ecology, A.C. (INECOL) has developed an organic product that controls the spread of mistletoe and does not affect the host plant. However, to deliver the compound to the area where the parasite grows can be difficult, as parasitized branches are often more than 20 meters high. Thus, researchers at the Advanced Technology Center in Queretaro (CIATEQ) have created a capsule and mechanical delivery device for the bio-pesticide.

For the development of the capsule, the researchers determined the physicochemical properties of the bio-pesticides as well as the degradation mechanism and action of the active agent in order to determine potential interactions between the chemicals and the capsule agent. In addition, they studied the various encapsulation techniques and biodegradable polymers that could be used to contain the bio-pesticide without interacting with it. Based on this, three polymers for the bio-film were selected. The capsule exhibits mechanical properties such that adequate impact fragmentation and release of its contents is achieved.

Mayra Angel, project leader, explains that the objective was that the capsules have sufficient mechanical strength to survive the forces to which they are subjected when shot at a tree, but which fragment on impact so that the contents adhere to the branches of mistletoe, gradually releasing the active agent.

For encapsulation, three biodegradable polymers were selected with a particular chemical resistance. The researchers tested the interactions between the polymers and active ingredients, and modified them to

increase stability, in addition to imparting an abrasive characteristic and improving its adhesion and retention on surfaces.

The resulting capsules are composed of two layers from three [biodegradable polymers](#) that are capable of containing the active agent, says Angel.

"The capsule formulation is unique in the market and considers aspects such as weather conditions and humidity forested; to evaluate the effectiveness of the product, made field tests in a forest near of Xalapa, Veracruz."



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Meanwhile, for the design of the device spear the capsules the researcher

worked with Management Renewable Engineering and the Department of Industrial Design, creating a prototype from commercial and custom parts.

The result was an innovative prototype resembling a firearm with aiming precision and power such that the capsule can reach up to 25 meters. According to Angel, industrial manufacture of the [capsules](#) and launcher device are technically feasible. Angel adds, "It is technology that can be adapted to other needs, for example for the application of other substance that should be dosed at considerable heights such as fertilizers, biological insecticides, etc."

Provided by Investigación y Desarrollo

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