

Translation of article:” Report from the magazine Olivar

[Nueva técnica de tratamientos terrestres a volúmenes ultra bajos contra la mosca del olivo](#)

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Sustainable treatments:

New technique ULV ground application for the control of Olive Fly.

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The Olive Fly *Batrcoera* (*Dacus Oleae*, Gmelin, is an endemic pest in olives that causes important losses in production and in the quality of the oil. The authors of this article describe the method of that they have perfected in developing a technique of ULV application with full production and efficacy.

In nearly all of the important olive groves there are cooperatives dedicated to the production of high quality ecological oil, whose production areas cannot be treated with conventional pesticides. These ecological areas although in total represent important areas that typically form a mosaic of ecological areas within the overall olive production area which restricts the use of aerial application in the regions where there is ecological production. This is the background in that these treatments have been made in the regions where it is not possible to use aerial application. Treatments have also been made in olives situated in protected zones where it is either prohibited or not feasible to utilize aerial application. On the other hand, unfortunately aerial application is under scrutiny of the European agricultural authorities whose regulations have to be followed by all members of the EU European Community. Currently it appears that the aerial application of all phytosanitary products is under study and it is expected that a list will be prepared within two years.

Prior to this situation, we have been conducting a series of experimental treatments against the olive fly using the methods that has now been developed to a technique for ULV application, which is being perfected step by step, to reach its current stage with full production and efficacy.

[The technique, and the application equipment, step by step.]

The technique of ULV consists in the application of volumes less than 15 L/ha with ground equipment. This technique is based on the principle that the smaller the droplets the lower the volume of solution required to obtain the same number of droplets per unit of surface area, in other words, to obtain the same coverage. The conventional ground application of crop protection chemicals is conducted using equipment that applies high volumes of liquid per

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hectare, including also for olives. The typical application volume using spray guns oscillates from 1000- 2000 liters of solution per hectare that corresponds to approximately 1.5 liters per tree depending on the planting density and the equipment utilized.

The grower likes that his olives are well wet, without realizing that almost 90% of the product terminates on the soil, without producing the desired biological result. Regardless of the volume that is applied to the olives, the leaves can only retain a relatively small amount and the rest is lost to the soil and only serves to contaminate the atmosphere.

Without doubt, with the ULV technique there is no waste of product, it all stays on the foliage of the trees and neither contaminates the air nor the soil. In addition, there is an economy in product and time, obtaining the same effect. The resulting treatment is much cheaper, and equally effective, wasting less time and product. The grower likes that his olives are well wet, without noticing that almost 90% of the solution terminates on the soil, without producing the desired biological effect.

For the application of this technique we can utilize two types of equipment based on the same technical principle. The equipment MICRONAIR AU8115M (Foto 1) mounted in an all-terrain pick up or tractor for extensive areas of olives. The other MICRONAIR Au8000 (Foto 2) is a backpack, that is utilized in mountain olives where the terrain is mountainous or abrupt, where it is not possible to circulate with an ATV. Both have an excellent performance and are the most recommended for the treatment of olives during control. These two models of atomizers differ in the size of the tank and in secondary details however their technical function is the same. They are based on the atomization of the solution into very small droplets, as earlier mentioned, that is effected within the head of the atomizer. This piece, the atomizer, is the technical base of the equipment.

Atomizer: key of the atomizer equipment.

This consists of a spinning head, similar to the MICRONAIR atomizers utilized for ULV aerial application, although smaller in size. This consists of cylindrical metal screen that rotates on a fixed shaft (Foto 3). This mesh drum is coupled to a metal support inside a tube where there is an air current produced by a fan, driven by a small 5 hp, two stroke engine in the back pack machines, and a 4 stroke 7 hp engine in the equipment mounted on the ATV vehicle. In both cases the atomizer is equipped with 4 propeller blades that produce rotation of the mesh drum due to the air flow from the blower. The angle of these propeller blades are adjustable, allowing for the mesh drum to rotate faster or slower according to the angle. The smaller the angle of the propeller blades the higher the rotation of the atomizer, and the smaller the droplets and vice versa.

The average droplet size produced by the MICRONAIR atomizer depends on the rotation of the atomizer. The rotation is created by the airflow and is a function of the velocity of the air within the tube and the angle of the propeller blades with respect to the airflow.

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The velocity of the airflow in the interior of the tube is determined by the rotational speed of the fan coupled to the fan motor. The tube that supplies the liquid is on the exterior of the air tubing. The liquid enters via a hollow shaft of the atomizer via a deflector that distributes the liquid to the rear end of the atomizer. The liquid is pre-atomized into relatively large droplets on reaching the central tube and then completely atomized due to the centrifugal force of the rotating mesh. The flow rate is controlled via a graduated dosage control mounted on the liquid supply line in the equipment MICRONAIR AU8115 mounted on pick-ups., while the backpack machine that doesn't have this device, it is necessary to mount a distinct orifice for each application volume within the supply tubing, immediately before the filter. These metering orifices are designated 1 to 5, from the lowest to the highest volume that enables us to adjust the application volume in each case.

Products and application:

The control treatments against the olive fly are conducted in swaths, applying the liquid on two consecutive rows, o HILOS, and leaving another six rows without treatment. The average application dosage with the ULV technique, equally so with backpack as with equipment mounted on an ATV is 50-60 cc/treated olive tree, which corresponds to a volume of 5 liters per treated hectare, and with the same quantity of active ingredient applied per hectare as with the conventional or aerial treatments. In the ecological treatments sexual pheromones and pyrethrins are applied in the following proportion:

Water:	88 liters
Natural pyrethrins:	20 liters
Sexual pheromones:	8 liters

In exchange, in the non ecological areas, various organophosphorus insecticides and hydrolyzed proteins were applied as bait in the following proportions:

Water:	80 liters
Organophosphorus insecticides:	20 liters
Hydrolyzed proteins;	20 liters

We do not define what insecticides are utilized, since the Crop Protection authorities in each Independent community have distinct thresholds regarding the insecticides to be used in function of the climatic characteristics of the FAUNA UTIL, or AUXILIAR present in the olives. Besides this, the European Community has just published a directive that eliminates some of the insecticides that were being used up to this moment, and specifying time limits on the utilization of others. The 100 liters of solution just mentioned is for the treatment of 2,000 olive trees considering the protection of a number of olives 4 times greater since only treating 3 rows out of each 8 rows, a quarter of the area. The real spacing of 7 x 7 meters, the treatment of 2,000 olives is equal to the treatment of 10 hectares, and as such the protection of 40 hectares. If the

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spacing is greater, the protected area will also be greater. The capacity of the tank of the MICRONAIR AU8115 mounted on pick up is, exactly 100 liters. In other words, with one tank full of solution with this equipment it is possible to protect an area of 40 hectares when the tree spacing is 7 x 7 meters.

Comparison with other treatments.

We are going to compare the continuation of these ULV treatments with the classical aerial application, or the normal using spray guns with ground equipment. There are some differences that it is convenient to highlight.

In the ground treatments using the ULV technique, all the solution, and therefore, all the active material and all the bait, stayed on the olives without any run-off, also no drift and application directly on to the olives.

The orthogonal layout of the olive groves on the ground occupies between 25-30% of the olive plantation, depending on the method of planting and the size of the olives, though it is difficult for the olives to occupy the half of the soil. Therefore, in the aerial application there is only a percentage of the product that falls on the olives analogous to the projection of the coverage of the soil, and the rest therefore some 70-75% falls onto the soil and is wasted.

Verification: In an olive plantation with a density of 7 x 7 in orthogonal layout the olives occupy 15 square metros of soil and with a density of 200 trees per hectare; this means that the total surface occupied by the olives is $15 \times 200 = 3,000$ square meters. This means that 70% of the soil is exposed and the product that falls there is lost.

In the aerial treatments it is also necessary to take into account the drift that occurs when the product is applied at 5-6 meters height above the ground, and not always under ideal atmospheric conditions, and not following the rows of trees. On the other hand we are going to compare the ULV treatments with those made in greater part with conventional equipment with spray guns.

1. The average dosage applied using the MICRONAIR equipment is 50 cc per olive tree. The conventional equipment using the spray guns generally apply more than 1 liter per tree. This doesn't imply that better treated, but the contrary. The liquid applied by the conventional equipment with very low concentration, is lost in great part to run-off and dripping from the leaves and ends on the soil instead of on staying on the leaves. There is nothing more to observe than the leaves of the olives, instead of staying covered with small droplets of solution, as occurs with the ultra low volume applications, there is run-off and dripping and the solution forms a stain on the tips of the leaves and the rest washes off. As can be imagined this signifies waste of money, and unnecessary contamination. On the other hand, the application of ultra low volumes leaves the entire product on the foliage of the olives without a single droplet lost in run-off, no

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drift and the concentration of the product is much greater, such that the biological effect is also greater.

2. The conventional equipment, with much greater application volumes, although also with a much greater tank capacity but utilize much greater volumes. If we consider a cube of 1500 liters of capacity and a usage rate of approximately 1 liter per tree (1.500 cc) we can only treat some 1500 trees per tank. Once empty the operator has to go to the nearest water source to refill with water and prepare a new mixture. One cube of this capacity needs nearly one hour to go, refill and return to the work, on a normal days work refilling 4 or 5 times dependent on the place and the proximity to water. In exchange, the application equipment MICRONAIR AU8115 M, mounted on an ATV, only need to load at the beginning of the day and do not waste time reloading. With an application of only 50 cc per tree, the tank of 100 liters enables the treatment of 2000 trees without having to refill the tank. Besides, in the transport box on the ATV, it is possible to transport products and water to prepare mixtures for 4 or 5 loads of 100 liters thus eliminating the need to return during the day. This signifies the treatment of 8,000 -10,000 olives without dead time, corresponding to the real treatment of some 50-60 hectares and therefore the protection of some 200- 240 hectares per day.
3. There is another factor to take into consideration. The velocity of a tractor during work is much slower than an ATV. Besides the ATV has greater maneuverability and agility during the work. This transforms into much higher productivity than the tractor machine. On the other hand, the equipment AU8115M is operated from within the cabin of the ATV, as it goes from tree to tree, without loss in time during the operation. There is also another laser device that automatically turns the chemical ON/OFF, as it goes from one tree to the next.

Spraying seasons and results:

The dates for the treatment of the olive fly are always determined by the corresponding technicians of the ATRIAS, Groups responsible for integrated pest control in each zone, following the habitual behavior of the flies, in general when 3 flies are caught per day per trap.

The olive fly first appears in their higher and cooler zones, spreading from there down into the warmer regions at lower altitude. Generally the first phase is started in the second half of July, and finishes in the second half of August. The second phase can occur in the second half of September and end of October or the beginning of November. Sometimes though rarely there is a third phase. In these occasions, the second phase can exceed the tolerance level of 3 flies/trap/day, and the third phase can terminate some days before the start of harvest of the olives within the harvest interval of the insecticide utilized.

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In the level zones the mounted AU8115M are utilized. In the more mountainous zones and uneven terrain the motorized back pack units AU8000 are utilized. In all cases average volume (VMFD) droplet sizes of 200 microns are utilized. In many zones where the terrain is mixed but with good access both types of equipment are used simultaneously, ATV and back pack units. The back packs are especially used for corners and more difficult access.

The speed of movement of a tractor in the work area is much slower than an (ATV) All Terrain Vehicle.

The results obtained in all of the campaigns conducted with ultra low volume equipment have been excellent. The proof of this is that only on rare occasions has it been necessary to make three applications and in some cases the problem has been resolved with only a single application. As a consequence, the treatments with this type of application equipment at ultra low volume result in more competitive prices for the grower. In these campaigns we have conducted the costs for the farmer has always been less than 4 Euros/ha for the equipment mounted on ATV's, in zones where this machine can operate. This cost depends fundamentally on the layout of the plantation and access for the vehicle.

In difficult terrain it is necessary to utilize backpacks and the cost is very variable depending on the accessibility and the daily cost of workers in the region. These workers are required to have an operating a basic license for the Manipulation of Crop Protection Chemicals and such are difficult to find in these work zones and therefore their salary must be higher than other non specialized workers.

Nevertheless, the cost of treatment of a hectare of olives, in an area inaccessible for an ATV, should not exceed 6 Euros.

Other applications

Within the olive sector there are other pests such as Pray citri, and Glipodos, which we have also made treatments with very good results. We have also applied the same technique for the control of the fruit fly, Ceratitis carpitata in citrus, such as nectarins, peaches, and pip fruit such as pears. Treatments have also been conducted in citrus plantations over all the trees that have proven to be very effective.

With back pack equipment AU8000 and higher application volumes than those utilized in the other cops (60-80 L/ha) applying imidachlorprid a very low rates, we have eliminated the potato beetle, *Leptinotarsa decernlineata* on the island of Ibiza after three years of treatment, (2002 until the year 2005). Since the beginning of this year we have found biological evidence of this insect in spite of intense inspections that are being made. This subject will be the title of another article in the magazine Agriculture in a coming issue, in which we will detail the techniques utilized and the operating modes with the results obtained during each year of treatment.

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Another important area of operation is the fight against the locusts in which this technique has practically monopolized the treatments for its economy and effectiveness, fundamentally against the Moroccan locust, *Dociostaurus maroccanus* and sometimes against the Italian locust, *Calliptamus italicus*. Against these pests we have treated some 50,000 hectares in the last three years in the Province of Salamanca, Albacete, Toledo, Almeria and Granada. Prior to these dates we have also realized treatments in the extremities of Caceres and Badajoz, especially in the area of Comarca.

Regions of utilization;

Madrid: in the districts and municipalities of Estremera, Brea de Tajo, Tielmes, Carabana, Villaconejos and Orusco.

Albacete: Sierra de Alcaraz, in the districts of Bienservida, Salobre, Villa palacios, Povedilla and Alcaraz.

Jaen: Sierra de Segura, Torres de Albanchez, Genave, Hornos de Segura, Penolite, In Sierra de Cazorla, LLa Ireuela, Belerda, Cazorla, Queda and Peal de Becerro, in Sierra Magina, Cambil and Huelma, in Torre del Campo and Jaen.

Cordoba: in Obejo, Pedroches, Pozoblanco, Villanueva de Cordoba and Baena.

Granada: in the Valle de Lecrin, Pino del Valle and others, Lanjaron, Orgiva, and in the hills of the Alpujarras, Ujijar, and in Castril and Huescar.

Sevilla: in the Sierra Norte, and in the districts of the municipalities of Alanis, Cazalla and Constantina.

Until now more than 200,000 hectares of olives have been treated with this Ultra Low Volume technique.

COSTS:

Given the characteristics of the ground equipment with ultra low volumes, we have commented throughout the article that the cost has been much reduced. To highlight the factors that make this more economic.

1. The application of low volumes. For the control of the olive fly it is only necessary to apply 50 cc per tree
2. It is possible to work all day without the need to reload with water or fuel thereby eliminating all dead time.
3. The ATV, all terrain vehicles are much faster than the tractors, and therefore cover more hectares per hour.

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4. There is no waste of product as with the conventional equipment through which the waste is less, and with the more concentrated product the effect lasts longer and the efficacy is greater.
5. As a consequence of its efficacy fewer applications are necessary to maintain control of the flies under the tolerance level of 3 flies/trap/day.
6. The amortization of the equipment is much less than for the conventional equipment.