

## VERDIVAP AIRSTEAM

BY Shiva Vencat

With a worldwide intensive production policy that makes it necessary to improve soil yields, it becomes necessary to disinfect exhausted earth before replanting. In the old days, farmers let the land lie fallow, which allowed the soil to rest and recover its productivity. Today, to regenerate lands used to grow market garden and horticultural products, pesticides are used in 90% of the cases. More specifically, methyl Bromide, which is a fumigant (gas), and is designed to eliminate worms, bacteria, fungi and other weeds. Technically, following are the properties of the pesticide that are valued: it acts as an insecticide, nematicide, fungicide and herbicide

Nevertheless, the use of these substances is a real danger for both people and the environment. The Montreal Protocol, ratified by 189 governments, aims to eliminate these substances that deplete the ozone layer, the only protective screen our planet has. Without the elimination of these products, according to experts from the United Nations Environment Program (UNEP), the destruction of ozone in the stratosphere will increase UVB radiation, substantially increasing the risks of cancers and cataracts and weakening people's immune systems. Another unfortunate consequence would be the deterioration of oceanic ecosystems, with disastrous effects for fauna, fishing, etc. If the timetables set by the Montreal protocol are scrupulously adhered to, the ozone layer should begin to reconstitute itself in about 50 years (UNEP, 6/27/2005).

Steam disinfection is a serious, environmentally friendly, non-chemical alternative. This method consists of heating the soil to a temperature that is effective against the harmful organisms. The vaporization is the introduction of steam in the soil, under plastic tarpaulins or using slabs or plates

The soil temperature and the length of the treatment determine whether the elimination of these organisms is complete (sterilization = a few minutes at 90-100°C), or if there is only a partial reduction of the soil's microflora (pasteurization = 20-30 minutes at 70-80°C). Steam increasingly being turned to as a replacement solution for methyl bromide in high value, protected intensive crop systems, such as flowers and vegetables, because it is one of the only alternatives having the properties of methyl bromide.

Steam is commonly used in commercial applications in **Australia** (cut flowers), in the **United States** (cut flower production in California), in **South Africa** (tomatoes, chrysanthemum cuttings), in **Kenya, Uganda and Tanzania** (chrysanthemums), in **Colombia, Brazil and Ecuador** (flowers and cuttings), in **Italy** (cut flowers), in **Belgium** (protected strawberries, tomatoes, lettuce and

leeks) and in the **Netherlands** (about 50% of the production of cut flowers, of which 900 hectares are devoted to chrysanthemum cuttings and radish), in the **United Kingdom** (tomatoes and lettuce), **Lebanon** (strawberries) and **Guatemala** (cut flowers), as well as for other crops in other countries mentioned in the Committee's 2002 Evaluation Report.

#### Advantages of disinfection by steam

It's clean and ecological.

There are no negative effects for the environment.

Similarly, there are no residues left on the crops or in the soil.

Aquifers are preserved and protected.

Steam disinfects but does not sterilize. Bacteriological flora reform naturally in a few weeks.

The soil may be used again a few days after the disinfection. The soil may be disinfected at any time of year, at a rate of approximately 100 m<sup>2</sup> of square surface area per hour.

#### Disadvantages of Disinfection by Steam

Setting up the facilities is a long and painstaking process.

The process is effective over a depth of about 15 centimeters, which is not enough to satisfy all types of crops.

Major costs: polyethylene tarps, excessive consumption of fuel oil (about 1.5 liters/m<sup>2</sup>).

If one interrupts the disinfection cycle, it becomes necessary to start up again from the beginning (the boiler runs 24 hours a day)

The disinfection depends on meteorological conditions (wind, cold and rain).

### THE VERDIVAP REVOLUTION

Twenty years of experience in the area of high pressure steam using plastic tarps and four years of study and research to mechanize the system have allowed us to complete VERDIVAP.

Our invention, patent n°EP 1479287 A1, successfully deals with the drawbacks outlined above by providing a mobile mechanism allowing for disinfection through the transmission of steam at a depth of up to 35 cm, while at the same time guaranteeing simultaneous coverage of various levels, including the surface level. One can then work the soil after it has been treated without running the risk of pulling up non-disinfected earth. Other systems only inject the steam deep down. Still other systems are immobile, which makes the disinfection process ineffective. The steam injected by blades is at 90° and an innovative distribution manifold makes it possible to ensure that diffusion through the soil is sufficiently homogeneous. There is no longer any need to mulch the soil with plastic film, and consequently, there is a lower risk of being exposed to the whims of the skies. Time savings are considerable. The system can treat a

surface area of 200 m<sup>2</sup> in an hour. The machine closes and gently presses the earth after its passage, thereby preventing the steam from coming back out and forcing the steam to work for hours. The earth is not dampened and can be immediately sowed or planted upon. It should be noted that the mechanism's slow rate of forward progress makes a key contribution to the system's efficiency. The consumption of fuel oil today is 0.8 liters per / m<sup>2</sup>! Furthermore, even the amount of water used is low (10 liters/m<sup>2</sup>), compared to 200-300 liters used for a washing after disinfection with methyl bromide. Better yet, disinfection with VERDIVAP « washes and cleans » the terrain. Indeed, the water and heat favor the elimination of pesticides or fumigants that might have been used in previous processes and that can remain months, even years, in the soil ! For all these reasons, VERDIVAP represents a unique process. It won the Gold Medal for Innovation and Ingenuity at the 2005 International Fair for Production Techniques for the Fruit and Vegetable Industry (**SIFEL**).

#### VERDIVAP AIRSTEAM :

VERDIVAP AIRSTEAM is the second generation of steam disinfection by using compressed air. This concept will make it possible to considerably reduce the amount of energy used (a gain of 80%). All this for a similar or superior result. Consequently, the system will also reduce user costs.

We are now able to disinfect at a fraction of Methyl Bromide i.e. US \$ 0.05 per sq ft as opposed to US \$ 0.20 per sq ft with Methyl Bromide.