Future foreseen

AGRICULTURE NEEDS SOIL FUMIGATION
New studies support the defence of sustainable soil fumigation in Europe

Sustainability

GREENER AND GREENER
Dutch flower bulb industry embraces green agents to control pathogens and parasites affecting flower bulbs

News and activities

THINK GLOBALLY, ACT LOCALLY
In 2017 the Certis CleanStart team has been involved into several events and activities outside Europe, like Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reduction

Snapshot from Italy

THE ART OF SHARING INFORMATION
Certis Europe, along with French and Italian farmers and experts, sharing experience on Cyperus control with DMDS 99 AL (dimethyl disulfide)

Science

LETTUCE FUSARIUM WILT: A THREAT TO EUROPE
A study of University by the Turin explores in depth Fusarium oxysporum f. sp. lactucae (FOL), causal agent of Fusarium wilt. An emerging threat for hort crops
All scientific progress produced during the last two decades in plant pathology - and especially in soil pest management - clearly shows that, following the methyl bromide ban, there is no single replacement solution that can substitute this molecule ensuring the same level of efficacy and results. The only approach possible is an integrated management system, including various control means, both chemical and non-chemical.

The study, entitled “Sustainability of European vegetable and strawberry production in relation to fumigation practices”, is a great effort by the authors and the sponsors, Certis and Arkema, which indicates that intensive cropping, with current farms structure in Europe, requires sustainable soil fumigation to be effective. In short, this study represents an extensive and unique analysis of multidisciplinary data which has been summarized in a reader friendly format, with the aim of showing a realistic and credible scenario.

The economic and social benefits of soil fumigation were deeply analyzed during this study, taking as example three major cropping systems: protected fruiting vegetables, strawberries and carrots. More than 600 interviews with growers was carried out the past three years and technical and financial information were collected from other interviews with technical directors of key professional organizations and sector experts. Moreover, almost 600 published efficacy studies were selected by experienced scientists to compare technical performance of chemical soil fumigation to alternative techniques and products.

Taking into account official statistics, both economical and technical, the financial and social impact of replacing chemical fumigation with available alternatives was also calculated. Social impact considered both the effect on employment (only for cultivation), the effect on trade balance and European self-sufficiency in terms of vegetable consumption. A key conclusion from the study is that alternative means are effective only in the case of low pest pressure and if used as complementary tools to soil fumigation, that is, if they are used within an integrated system. For instance, given the farm structure in Southern Europe, unlike Northern European ones, soilless cropping seems a realistic solution only on a small part of the total land in which fumigants are used.

The reasons for adopting soil fumigation relate to the needs of farmers, food value chain and consumers, which are satisfied by this technology. The tremendous benefits generated by soil fumigation are based on the possibility of starting the crop cycle with reduced pest pressure and weed infestation, allowing a considerable reduction of treatment during the rest of the cycle itself. Therefore, this approach also fulfills an effective residue reduction strategy.

Without soil fumigation the use of chemicals during cultivation would increase dramatically to control high soil pest pressure. Due to this, several growers would abandon the business as no longer profitable and fresh food quality and quantity stability would become an issue, making Europe dependent on the production of extra-EU countries. This would also increase the carbon footprint due to long transportation, impacting the environment with more Greenhouse gases. Finally, abandon of business would lead in many cases to damage the social structure and employment in rural areas analyzed.

Please refer to your Certis contact person for more information.
The Dutch flower bulb industry embraces green agents to control pathogens and parasites affecting flower bulbs

The Dutch tradition of flower bulbs was born officially in 1592, when Carolus Clusius wrote the first book on tulips, which were imported into Holland during the 16th century. Unfortunately, these crops suffer many different attacks by fungi, insects and nematodes, even virus transmitting ones. Therefore, it is essential to ensure a clean start to the cultivation of flower bulbs and new technical trends show an increase in natural solutions to control phytosanitary adversity, as public support for chemical intervention is on the wane. This point has been well stressed by Peter Smits, on behalf of KAVB (Dutch Royal General Bulb Growers’ Association): “We are compelled to become an industry with a more favourable environmental profile. This demands healthy soil, resistant crops and more green agents.”

The Netherlands is home to large-scale flower breeding, with a total area of 15,500 ha dedicated to spring flowers, like tulip, narcissus, hyacinth, iris and crocus, and 5,000 ha to summer flowers, namely lily, gladiola and Zantedeschia. Tulips and lilies are the most common varieties, but they too come with their own sets of difficulties owing to their strongly divergent cultivation periods and varietal sensitivities. Both varieties require intensive care before, during and after cultivation, like bulb sterilisation, soil sterilisation and frequent field spraying with mineral oil, fungicides and insecticides. This may cause a negative perception in residents living close to the fields.

So, the image of the industry to the outside world needs to be improved. This push toward an increasing use of products with a favourable environmental profile, is a way to maintain public support. As Peter Smits says, “It will take a lot of time and effort to establish the desired profile, and even more time and effort to adjust the environmental image of the industry. I view this as a wonderful challenge.” Now, the flower industry is looking at biological and agronomic solutions. For instance, breeders should avoid varieties highly sensitive to fungal diseases, such as Fusarium and Botrytis. Rotation with other crops may also help in pest management: after growing Tagetes, lesion nematodes are much less prevalent in the soil for some time. Unfortunately, this is not the case with all types of nematodes. Furthermore, in some areas inundation helps against stem nematodes. Last but not least, yellow nitsedge, for which a “zero tolerance policy” is applied, as for virus-transmitting nematodes. At present, in case of infestation, the only remedy is to destroy the crop. Recently good new green alternatives, such as DMDS (dimethyl disulphide) and a garlic extract based product effective against nematodes and yellow nitsedge, have been introduced by Certis Europe. The Company is indeed committed to broadening the range of green agents, which is engrained in its mission and strategy. “The flower bulb industry will also benefit from this - explained Wouter Bulk, industry specialist from Certis Netherlands - We have high expectations for our new product Accolade, which contains the active substance DMDS. Certis is working on registrations for nematode control for several crops and in several European countries. Exemptions in some countries have already resulted in successful applications. In anticipation of regular registration, a waiver application has been submitted in the Netherlands for application of DMDS to combat yellow nitsedge in flower bulb cultivation. We trust that this waiver will be granted soon.”

But DMDS is not the only sustainable solution in which Certis Europe is investing: it is also working on microorganisms, including nematophagous fungi and appropriate application techniques that may increase the chance of establishing these microorganisms in the soil also form a part of this.
In 2017 the Certis CleanStart team has been involved in several events and activities outside Europe, such as the Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reduction. Share issues and ideas to reach common objectives. This is the focus around which several experts of nematode management met in San Diego, California, from 13th to 15th November 2017, to attend the annual “Methyl Bromide Alternatives Outreach meeting” (MBOA). Many soil experts from regulatory agencies, research centers, extension and industry, had the opportunity to share their own experiences with other thus establishing the status of the methyl bromide replacement process in soil-pest management. The meeting had a strong international connotation, with several participants and contributors from other geographies such as the Americas, Europe, Asia and Australia, beside US participants.

The meeting also allowed sharing of an update about alternatives to methyl bromide, including chemical and non-chemical solutions. A particular focus was dedicated to fumigant sustainability for farmers, discussing technical aspects, efficacy, cost/benefit returns and possible environmental impact.

On behalf of the CleanStart team of Certis Europe, Nicola de Tommaso and Arben Myrta attended the meeting, sharing an overview on the regulatory status of fumigant registration in the EU. Moreover, Nicola and Arben were able to show new development results of DMDS in Europe. MBOA also allowed sharing of different technical experiences and opinions, bridging a relationship in particular with Florida University researchers, a notable source of information targeting soil pest management, with special attention to nutedge control, as nowadays this invasive weed is the main soil issue in Europe.
Visit of CleanStart team to Florida

Two Certis’ colleagues, Maria Jesus Zanon (Certis Spain) and Edwin Hendriks (Certis Netherlands) were kindly invited by Arkema to visit Florida, with the main objective of seeing the results of different Accolade applications on several crops. Strawberry and tomato fields were visited in particular. In terms of application method, a completely different scale of operation was evident in Florida compared to Europe, where areas involved per treatment are smaller. Nevertheless, large scale applications of Accolade were professionally carried out by growers, who worked according to the best practice principles developed by Arkema and Certis Europe. As a consequence, in both strawberries and tomatoes a high level of control of rootknot nematodes was recorded, as well good control of nutsedge.

These sound results were also shown at Florida ExpoAgro, one of the major agricultural fairs in the United States, where different field trials on vegetables demonstrated a high control of weed and nematodes through fumigation and good soil management. It was clearly proven that DMDS is a key product in nutsedge control. Also different new biorational products, under development within the Cleanstart Portfolio, showed promising efficacy in nematode control.

Good nematode control is the first step to obtain “High Quality & Quantity Harvest”
In late Summer, a group of French producers and technicians from Normandy (France) landed in Fiumicino, in Lazio Region, representing Agrial, GPLM, Sileban, but also independent producers.

The reason why they came to Italy raises the name of Cyperus esculentum. Indeed, Lazio Region is one of the most important areas for carrot production and a lot of trials have been performed there with dimethyl disulphide -based products, like Certis Europe’s DMDS 99 AL: important experimental work in support of a derogation request for next season relating to Cyperus control.

This process needs data, so an intensive trials program has been carried out in the most affected areas in Italy and France, specifically to consolidate Certis experience on this weed. Meantime, all the trials on going have been visited by stakeholders and officials for a fruitful sharing activity of efficacy data on the use of sustainable fumigants.

To guide the technical delegation, led by Philippe Sunder (Applications & Stewardship Manager), were Chiara Mariotti (Technical Advisor Central Italy) and Alberto Santori (Senior Development Specialist) from Certis Italy. The first visit was to the farm of Maurizio Tiozzo, one of the most representative producers of the Fiumicino area. Thanks to Maurizio and to Tiziano Biancari (local technician), the team had the opportunity to discuss local agronomic practices and other technical aspects of carrot production and to appreciate the results of the trial carried out on Cyperus, a weed on which there is currently no real effective strategy in Italy. So the weed is becoming a real concern for all areas in Europe where vegetables are grown intensively on light soils with short rotations; a weed qualified as “invasive plant” by EPPO for its impact on yield and quality. The Italian trials demonstrate very good control of Cyperus, as happened also in other different countries, even under Mediterranean weather conditions, stimulating farmers to use the product as soon as possible to manage both Cyperus and nematodes.

The visit of the French team to this Italian trial was a great example of a fruitful collaboration between Certis Europe branches and a good opportunity to share technical experiences between growers and technicians.
Lettuce is affected by severe losses caused by many pathogens (Subbarao et al., 2017; Barrière et al., 2014) and among them soil-borne pathogens play a major role (Garibaldi et al., 2014). The most important soil-borne pathogen, affecting lettuce worldwide, is *Fusarium oxysporum* f. sp. *lactucae* (FOL), causal agent of Fusarium wilt. The Fusarium wilt of lettuce was detected for the first time in Europe, in northern Italy, in 2002 (Garibaldi et al., 2002), where the pathogen on ‘Salad bowl’ lettuce grown in northern Italy under intensive cropping systems for the ready-to eat sector was found. *F. oxysporum* f. sp. *lactucae* is host specific, and causes yellowing of the leaves, wilting and brown or red streaks in the vascular system of lettuce, as well as stunting and plant death. The cortex of the crown and upper root of infected plants was usually decayed and reddish brown (Figures 1-5).

Four races (1, 2, 3 and 4) have been identified so far: race 1 was first described in Japan in 1967 (Matuo and Motohashi, 1967), and was reported in the United States in 1993 (Hubbard and Gerik, 1993), Iran in 1995 (Millani et al., 1999), Taiwan in 1998 (Huang and Lo, 1998), Brazil in 2000 (Ventura and Costa, 2008), Portugal in 2004 (Matheron and Gullino, 2012), Argentina in 2014 (Malbrán et al., 2014) and France (Gilardi et al., 2017c). Until recently, races 2 and 3 had only been reported in Japan (Fujinaga et al. 2001; 2003; 2005). However, Lin et al., (2014) have recently detected a highly aggressive isolate of FOL in Taiwan, which has been classified as race 3. Recently, race 4 is gradually spreading to new countries in Europe: it was first isolated in the Netherlands in 2015 (Gilardi et al., 2017a), then in UK (Hortibiz, 2017) and Belgium (Hortibiz, 2017).
This pathogen spreads easily and quickly also due to the fact that it is seed-borne (Garibaldi et al., 2004 b; Mbofung and Pryor 2010), which complicates its prevention and management. Moreover, lettuce Fusarium wilt management is made difficult by several factors, including the reduced availability of effective chemicals for soil disinfestation; the presence of at least four races of the pathogen, which complicates selection for resistant varieties; and the susceptibility to the pathogen of the varieties mostly appreciated by consumers (Garibaldi et al., 2004 a; Scott et al., 2010 a,b; Matheron and Gullino 2012; Gordon and Koike 2015; Gilardi et al. 2017b).

Once introduced into a growing area, this pathogen may survive indefinitely on the roots of asymptomatic reservoir hosts such as melon, tomato, watermelon, cotton, broccoli, cauliflower and spinach (Hubbard and Gerik, 1993; Scott et al., 2014). Thus, resistant lettuce varieties and rotation crops can contribute to an increase in soil inoculum. Soil temperature also has an important effect on the disease expression of lettuce Fusarium wilt, and it has been shown to be a key factor that can influence the success of the control measures (Scott et al., 2010a). In practice, Fusarium wilt management relies on the combination of control measures, that needs to be adapted to the different cultural practices used in different cropping systems (Garibaldi et al., 2004 a; Matheron and Gullino, 2012; Scott et al., 2014; Gordon and Koike, 2015; Lopez et al., 2014; Gilardi et al., 2016; Gilardi et al., 2017b). F. oxysporum f. sp. lactucae is a serious threat to lettuce growers and requires a great deal of attention in order to avoid its rapid spread to new cultivation areas. Effort for continuous monitoring and disease surveillance, for the implementation of preventative and control measures is necessary.


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