Infectious diseases and certification of olive: an overview

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An account is given of diseases of olive (Olea europaea var. sativa) and related pathogens transmitted with propagation material, with special reference to viruses and phytoplasmas. To date, 14 virus and virus-like diseases have been described and 12 different viruses and five phytoplasmas have been identified in symptomatic or symptomless plants. A brief description of the diseases is given, along with information on epidemiology and diagnosis. Possible remedies, such as sanitary selection, sanitation and implementation of certification schemes are discussed.

Introduction

Like other vegetatively propagated crops, olive (Olea europaea var. sativa) is affected by a number of potential or actual pathogens, i.e. viruses, phytoplasmas, bacteria and fungi, that persist in the budwood and can be transmitted and disseminated with it. Some of these are agents of recognized diseases, others cause latent infections, whose effect on the host is yet to be determined. This presentation updates previous reviews (Martelli, 1981; Martelli & Gallitelli, 1985; Barba, 1993; Martelli & Prota, 1997), addressing issues related to infections by viruses and phytoplasmas.

Early studies

Pesante (1938) was the first to suggest the possible existence of virus diseases in olive. In Lazio (central Italy), he observed trees with rosetting, witches' brooms, bronzing, marginal scorching and shedding of the leaves, phloem necrosis and progressive decline. No graft transmissions were attempted from diseased plants, but the trials later carried out by Fogliani (1953) with material from olive trees showing the same symptomatology as described by Pesante (1938) were negative. This opened the way to the demonstration that Pesante's putative virus disease was in fact a physiological disorder (leptonecrosis) caused by boron deficiency (Ciferri et al., 1955; Ciccarone, 1956).

Studies on virus diseases of olive were resumed in the 1950s. In those years, great attention was paid to morphological and/or chromatic alterations of the leaves, often accompanied by fasciation and bifurcation of the shoots. The infectious nature of these foliar abnormalities was controversial, as it was not supported by successful graft transmission tests to olive (Ciferri et al., 1953; Fogliani, 1953). However, subsequent trials from donors showing typical symptoms induced vein banding and mild deformation of the leaves in grafted Ligustrum lucidum. These responses were interpreted as being caused by a virus contracted from olive (Corte et al., 1961), but the virus was not identified and back transmissions to olive were not made.

Sickle leaf

The characterizing symptom of this disease is the frequent presence of sickle-shaped leaves in affected plants. As this condition is also originated by pest injuries and is rather common in otherwise normal olives, not much credit was
The comparable structures induced by strawberry latent ringspot nepovirus (SLRSV) in different plants. SLRSV was soon afterwards isolated from the tubule-containing plant, providing the first experimental evidence of a true virus infection in olive (Savino et al., 1979).

Recent investigations: virus-like diseases

Since the early 1980s, a number of viruses have been recovered by sap transmission from olives and several new disorders described, some of which are best classified as virus-like diseases, whereas others (below) appear to be true virus diseases.

Spherosis

Spherosis is a disease of cv. Manzanillo and other cultivars reported from Israel. Symptoms consist of dwarfing, reduced vigour, low productivity, development of mini-spheroblasts on the trunk and branches, and occasional decline (e.g. cv. Nabali). The disease is graft transmissible and seems to be spreading naturally. Neither the agent nor the possible vector have been identified (Lavee & Tanne, 1984).

Bark cracking

This disorder occurs in Jordan in cv. Nabali. Affected plants are dwarfed, bear little fruit and show a remarkable thickening and cracking of the cortex above the crown. This condition persists in the budwood, with which it can be disseminated. The causal agent is unknown, and the results of graft transmission tests to healthy olives are not yet available (Martelli et al., 1995a).

Fruit pox and fruit hump

These alterations of olive fruits reported from Greece are characterized either by the appearance of sunken brown lesions on the fruit surface (fruit pox) or of whitish smooth swellings and delayed ripening (fruit hump). A possible viral origin was hypothesized for both disorders, but experimental evidence of this is still lacking (Kyriakopoulou, 1996). Fruit hump recalls the alterations observed on the fruits of SLRSV-infected olive trees in Italy (Marte et al., 1986).

Recent investigations: virus diseases

Except for the disease denoted ‘bumpy fruits’, there is no ultimate evidence that the other diseases discussed hereafter are truly caused by viruses, for Koch’s postulates have not been fulfilled. However, the type of symptoms shown by infected plants, and the consistent association of certain viruses with them, strongly suggest that these viruses may be implicated in disease aetiology (Table 2).

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**Table 1** Graft-transmissible diseases of olive, described from 1950 to date, with which unidentified non-mechanically transmissible agents are associated

<table>
<thead>
<tr>
<th>Disease</th>
<th>Mechanical transmission</th>
<th>Graft transmission</th>
<th>First record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early records</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial paralysis</td>
<td>–</td>
<td>+</td>
<td>Argentina 1950</td>
</tr>
<tr>
<td>Foliar deformation</td>
<td>–</td>
<td>+</td>
<td>Italy 1961</td>
</tr>
<tr>
<td>Sickle leaf</td>
<td>–</td>
<td>+</td>
<td>California (US)1958</td>
</tr>
<tr>
<td>Infectious yellows</td>
<td>–</td>
<td>+</td>
<td>Italy 1959</td>
</tr>
<tr>
<td>Recent records</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spherosis</td>
<td>–</td>
<td>+</td>
<td>Israel 1984</td>
</tr>
<tr>
<td>Bark cracking</td>
<td>–</td>
<td>(?)</td>
<td>Jordan, 1995</td>
</tr>
<tr>
<td>Fruit pox</td>
<td>–</td>
<td>Not done</td>
<td>Greece 1996</td>
</tr>
<tr>
<td>Fruit hump</td>
<td>–</td>
<td>Not done</td>
<td>Greece 1996</td>
</tr>
</tbody>
</table>

–, Transmission not made or unsuccessful; +, positive transmission; (?), results of graft transmission trials not yet available.

given to its viral nature until the syndrome was reproduced in California (US) by graft transmission to olive (Thomas, 1958). This result was later confirmed using symptomatic material from Israel as the source of inoculum (Waterworth & Monroe, 1975). The conclusion was that a sickle-leaf condition can be associated with the presence of a graft-transmissible agent whose nature is, however, still unknown. No further studies on olive sickle leaf have been conducted for the last 20 years or so.

Infectious yellows

This disease, observed in Umbria (central Italy) in cv. Dolce Agogia (Ribaldi, 1959), differs remarkably from other putative virus-induced disorders of olive described in the 1950s because of the symptoms. These consist of bright yellow discolorations of the leaves, which are best expressed at temperatures below 20°C. The field syndrome was reproduced in wild olive (O. europaea var. oleaster) by grafting, but the causal agent was not identified (Ribaldi, 1959). As discussed below, various types of filamentous viruses have recently been discovered in olives from other Italian regions, exhibiting a chrome-yellow condition of the leaves. It is therefore possible that the disease described by Ribaldi (1959) may fall in to that complex of leaf-yellowing syndromes strongly suspected to be of viral nature.

Strawberry latent ringspot nepovirus

Investigations on virus disease of olive resumed momentum in the late 1970s after the detection of virus-containing tubules in thin-sectioned pollen grains of a symptomless plant of cv. Corregiolo from Toscana (central Italy) (Pacini & Cresti, 1977). These tubules had the same outward aspect of
Table 2 Diseases of olive with which recognized viruses are associated

<table>
<thead>
<tr>
<th>Disease</th>
<th>Mechanical transmission</th>
<th>Graft transmission</th>
<th>First record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bumpy fruits</td>
<td>+</td>
<td>+</td>
<td>Italy 1986;</td>
</tr>
<tr>
<td>Vein yellowing</td>
<td>+</td>
<td>Not done</td>
<td>Portugal 1992;</td>
</tr>
<tr>
<td>Leaf yellowing</td>
<td>+</td>
<td>+</td>
<td>Italy 1995</td>
</tr>
<tr>
<td>Yellow mottling and decline</td>
<td>+</td>
<td>No take</td>
<td>Italy 1996</td>
</tr>
<tr>
<td>Vein banding</td>
<td>+</td>
<td>+</td>
<td>Italy 1996</td>
</tr>
<tr>
<td>Vein clearing</td>
<td>+</td>
<td>(?)</td>
<td>Italy 1996</td>
</tr>
</tbody>
</table>

+, Positive transmission; –, negative transmission; (?), results of graft transmission trials not yet available.

Bumpy fruits

Small, pear-shaped, puckered fruits with deformed kernels (bumpy fruits) are produced by plants of cv. Ascolana tenera affected by SLRSV, which also exhibit narrow and twisted leaves, husky growth and reduced crop (Marte et al., 1986). This disease was originally found in Umbria (central Italy), but similar symptoms were observed in cvs Negrinha and Galega in Portugal, where a severely reduced rooting ability of the cuttings was also ascertained (Henriques et al., 1992). SLRSV was reported to infect 15 different cultivars in Portugal, only some of which showed symptoms (Henriques et al., 1992), in agreement with what was observed in Italy (Savino et al., 1979; Marte et al., 1986). No symptoms are apparently associated with SLRSV infections in Spain (Bertolini et al., 1998).

Reproduction of field symptoms in graft-inoculated rooted cuttings of cv. Ascolana tenera and recovery of SLRSV from symptomatic cuttings were taken as evidence that SLRSV is the causal agent of bumpy fruit (Marte et al., 1986), a conception shared by Henriques et al. (1992).

Leaf-yellowing complex

Three different diseases, denoted ‘vein yellowing’ (Faggioli & Barba, 1995), ‘leaf yellowing’, and ‘yellow mottling and decline’ (Savino et al., 1996), constitute the leaf-yellowing complex. The characterizing features of the complex are poor fruit set and bright-yellow discoloration of the foliage that, in the case of yellow mottling and decline, is accompanied by necrosis of the leaves, extensive defoliation and dieback.

Olive trees with yellow leaves were observed in Lazio (central Italy), and in Calabria and two different localities of Sicilia (southern Italy). Filamentous viruses belonging to the genus Potexvirus (olive vein yellowing-associated potexvirus, OVVYaV) and a yet undetermined genus (olive yellow mottle and decline-associated virus, OYMDaV) were recovered by sap transmission from plants affected by vein yellowing (Faggioli & Barba, 1995), and by yellow mottling and decline (Savino et al., 1996) respectively. No virus could be isolated from plants with leaf yellowing, but the field syndrome was reproduced in healthy plants of the same cultivar (cv. Biancolilla) by grafting. No graft take was obtained with repeated attempts to transmit the yellow mottling and decline syndrome to a range of olive cultivars (V. Savino, pers. comm.).

Intriguingly, a dsRNA ~15 kbp in size was found in most of the trees with yellow leaves, regardless of whether or not they contained OVVYaV or OYMDaV, or no mechanically transmissible viruses. A sequence with high homology with the HSP70 gene of closteroviruses was identified in all plants containing the large dsRNA (Sabanadzovic et al., 1999). Although all attempts to visualize virions failed, it was concluded that an unidentified closterovirus, denoted olive leaf yellowing-associated closterovirus (OLYaV), frequently occurs in olive trees with a yellow condition of the foliage. The aetiological role of this virus remains to be determined.

Vein banding and vein clearing

These two diseases were recorded from Toscana (Central Italy). Vein banding is characterized by chlorotic to yellow discolorations along the main veins, poor fruit set, severe defoliation and decline. A strain of tobacco mosaic tobamovirus (TMV) was isolated from diseased plants and identified serologically in their tissues. As yet, no conclusive evidence has been obtained showing that TMV is the actual agent of the disease (Triolo et al., 1996).

Symptoms of vein clearing are very mild chlorotic discolorations of the leaf veins. An unidentified mechanically transmissible virus with isometric particles about 28 nm in diameter, called olive semilatent virus (OSLV), was recovered from affected plants, and virus particles were observed in their tissues. As in the preceding case, there is no ultimate proof of the aetiological involvement of this virus in the disease (Materazzi et al., 1996).

Viruses infecting olive in nature

Virus types

Olive is the unsuspected host of a wide array of viruses. Since 1979, 11 different viruses belonging to six different genera have been isolated by inoculation of sap expressed from flowers, leaves or young fruits, and part of the sequence of a 12th virus (a putative closterovirus) has been identified in tissue extracts (Table 3). It is quite possible, however, that a number of other viruses that are either non-mechanically transmissible or occur in low concentration in plant tissues, and thus are difficult to recover, are present in nature. An indication of this is the widespread occurrence of double-stranded RNAs (dsRNAs) in plants that resist all attempts to virus recovery by manual inoculation (Martelli et al., 1995a,b). Molecular techniques can be very valuable for sorting out these recalcitrant viruses. One such example is...
the identification of the non-mechanically transmissible OLYaV in plants with leaf yellowing, based on the consistent detection of closterovirus-specific RNA sequences in plant tissues.

Interestingly, most of the successful virus isolations were from symptomless plants, which explains the recurrence of the word ‘latent’ in so many virus names. Some of the olive-infecting viruses are ubiquitous and polyphagous, such as, for instance, cucumber mosaic cucumovirus (CMV), TMV, and three of the nepoviruses – SLRSV, arabis mosaic nepovirus (ArMV) and cherry leaf roll nepovirus (CLRV). Others, named after olive, may be host-specific. This still holds true for olive latent ringspot virus (OLRSLV) (Savino et al., 1983), olive latent virus 2 (OLV-2) (Savino et al., 1984; Grieco et al., 1992), OYYaV (Faggioli & Barba, 1995), OYMDaV (Savino et al., 1996), OSLV (Materazzi et al., 1996) and OLYaV (Sabanadzovic et al., 1999), but not for OLV-1 (Gallitelli & Savino, 1985), which has recently been isolated from citrus in Turkey and Italy (Martelli et al., 1996). It will not be surprising if future studies show that a number of the currently presumed olive-specific viruses have a wider natural host range.

Epidemiology

Next to nothing is known about the epidemiology of olive viruses. Four are alleged to be soil-borne viruses that can infect a variety of crops either through nematode feeding (SLRSV and ArMV) or directly, without the intervention of vectors (OLV-1 and TMV). However, whether these mechanisms operate also with olive under field conditions is unknown. In fact, field transmission of these viruses appears unlikely when one considers the random distribution and the low incidence of infections and, for nepoviruses, the apparent absence of vectors in the soil and of typical infection foci in orchards. Equally unknown is the epidemiological behaviour of other viruses, even though in other crops one of them is transmitted by aphids (CMV) and another by pollen (CLRV).

The preliminary results of recent experiments showed that RNA sequences of OLYaV were present in the psyllid *Euphysylla olivina* and in an unidentified *Pseudococcus* species that had fed on young olive plants infected by grafting with budwood from trees with leaf yellowing (Sabanadzovic et al., 1999). This opens intriguing possibilities on the natural transmission of this virus, which are now being explored.

Hypothesizing how viruses came in contact with olive trees is not easy. The role of possible vectors cannot be dismissed, but is not proven either. Occasional infections in the nursery may explain the erratic distribution and the low number of infected trees in the field. The point remains that for olive, as with other woody crops, infected propagating material might represent the major, if not the only, means of virus dissemination.

Diagnosis

With most crops, field symptoms give the first indication of the presence of virus infections and, often, a hint to the type of the causal agent involved. With olive this is not so. Most of

<table>
<thead>
<tr>
<th>Virus</th>
<th>Genus</th>
<th>Geographical distribution</th>
</tr>
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<tbody>
<tr>
<td>Strawberry latent ringspot (SLRSV)</td>
<td>Nepovirus</td>
<td>Italy 1979; Portugal 1990; Spain 1998</td>
</tr>
<tr>
<td>Arabis mosaic (ArMV)</td>
<td>Nepovirus</td>
<td>Italy 1979</td>
</tr>
<tr>
<td>Cherry leafroll (CLRV)</td>
<td>Nepovirus</td>
<td>Italy 1981; Portugal 1990; Spain 1998</td>
</tr>
<tr>
<td>Cucumber mosaic (CMV)</td>
<td>Cucumovirus</td>
<td>Italy 1983; Portugal 1993; Spain 1998</td>
</tr>
<tr>
<td>Olive latent ringspot (OLRSLV)</td>
<td>Nepovirus</td>
<td>Italy 1983; Portugal 1990</td>
</tr>
<tr>
<td>Olive latent 1 (OLV-1)</td>
<td>Nectovirus</td>
<td>Italy 1984; Jordan 1994; Turkey 1996</td>
</tr>
<tr>
<td>Olive latent 2 (OLV-2)</td>
<td>Oleavirus</td>
<td>Italy 1984</td>
</tr>
<tr>
<td>Olive vein yellowing associated (OYVaV)</td>
<td>Potexivirus</td>
<td>Italy 1994</td>
</tr>
<tr>
<td>Olive yellow mottling and decline associated (OYMDaV)</td>
<td>Trichiuvirus</td>
<td>Italy 1996</td>
</tr>
<tr>
<td>Tobacco mosaic (TMV)</td>
<td>Tobamovirus</td>
<td>Italy 1996</td>
</tr>
<tr>
<td>Olive semilatent (OSLV)</td>
<td>Undetermined</td>
<td>Italy 1996</td>
</tr>
<tr>
<td>Olive leaf yellowing associated (OLYaV)</td>
<td>Closterovirus</td>
<td>Italy 1998</td>
</tr>
</tbody>
</table>

Table 3. Viruses infecting olive in nature, their taxonomic affiliation and geographical distribution

Geographical distribution

Most of the extant olive virus records come from Italy and Portugal, where extensive investigations have been carried out. However, there is little doubt that viruses infect olive crops elsewhere. Evidence is provided by the virus-like disorders reported from countries other than Italy and Portugal (Table 1), by the recovery of olive latent virus 1 (OLV-1) from Jordanian (Martelli et al., 1995a) and Turkish (Martelli et al., 1996) olive trees, and by the recent recording of CMV, SLRSV and CLRV from Spain (Bertolini et al., 1998).
the natural infections are symptomless, and those viruses that elicit symptoms in certain cultivars (e.g., SLRSV) are latent in others. Although testing on differential indicators represents the main bioassay for sorting out and identifying infectious others. Although testing on differential indicators represents transmission to herbaceous hosts has been extensively used, for differential indicators are not available. Mechanical transmission to herbaceous hosts has been extensively used, and still is, for the recovery of viruses from symptomatic or symptomless plants. It constitutes the only applicable bioassay available, but the low intrinsic sensitivity of the method makes it unreliable.

SLRSV and CMV were successfully detected by double-antibody sandwich enzyme-linked immunosorbent assay (DAS-ELISA) in field samples in Portugal (Henriques et al., 1992; Rei et al., 1993) and Spain (Bertolini et al., 1998), but not by the author in Italy. Triolo et al. (1996) was able to identify TMV by DAS-ELISA only in concentrated partially purified extracts from olive tissues. Thus, ordinary DAS-ELISA may not be the technique of choice for the consistent and sensitive detection of viruses in olive. Before dismissing immunoenzymatic tests, however, more sensitive ELISA variants are worth trying.

dsRNAs are readily extracted from cortical scrapings of young shoots and are good markers for infection, but too little is, as yet, known to use their banding patterns for the identification of individual viruses (Martelli et al., 1995b; Sabanadzovic et al., 1999). dsRNAs are surprisingly frequent in olives (a survey still under way in Italy indicates that about 50% of examined trees contain dsRNAs) and are invaluable for detecting unknown viruses that cannot be sorted and identified by traditional means.

Molecular diagnosis appears more promising than any of the above diagnostic methods, although limited experience is available with olive viruses. Molecular hybridization (dot-blot) may encounter the same difficulties as DAS-ELISA, if the concentration of target viral RNA is low, as may be the case with some viruses. By contrast, polymerase chain reaction (PCR) should in principle be applicable to the detection of all viruses. The successful identification by PCR of OLYaV, CMV and OLV-1 (Bertolini et al., 1998; Sabanadzovic et al., 1999; F. Grieco, pers. comm.) speaks in favour of this. Since the genomic sequences of the majority of viruses, including the somewhat rare OLV-1, OLV-2 and OLRSV, are known (Grieco et al., 1995, 1996a,b), the design and use of adequate PCR primers is now quite feasible.

Phytoplasma diseases

In recent years, in some regions of central (Abruzzo, Lazio, Marche and Toscana) and southern Italy (Puglia and Sardegna), syndromes characterized by bushy growth, witches' brooms, chlorosis and deformation of the leaves, flower abortion, bud failure and formation of spheroplasts with rosettes of shoots have been observed (Danielli et al., 1996; Del Serrone et al., 1996). An infectious agent inducing virescence and other symptoms typical of phytoplasma infections was transmitted by dodder to periwinkle (Catharanthus roseus) from a symptomatic tree from Abruzzo. An unidentified DNA differing from that of aster yellows (AY) phytoplasma was identified by PCR and restriction fragment length polymorphism analysis (RFLP) in both olive and periwinkle (Del Serrone et al., 1996). However, phytoplasmas of the AY and of the peach X disease groups were identified in symptomatic plants of cv. Frantoio in Toscana (Danielli et al., 1996). Sticky yellow traps placed in the canopy of symptomatic trees captured several leafhopper species, among which some specimens of Hylestes spp., one of the recognized genera of phytoplasma vectors (Del Serrone et al., 1996).

In the same years, olive plants of cvs Leccino and Frantoio with symptoms quite different from the above (i.e., yellow discoloration and deformation of the leaves of some branches) were observed in the province of Trento (northern Italy). These plants contained a phytoplasma of the elm yellows group, as identified by PCR and RFLP analysis (Poggi Pollini et al., 1996). The most recent phytoplasma record comes from Spain, where a species of the stolbur group has been identified in olive trees with witches' broom symptoms (Font et al., 1998).

The above are the first world records of phytoplasma presence in olive, demonstrating that a variety of these pathogens (at least five different species) can infect O. europaea in which they are suspected of inducing severe diseases.

Possible remedies

Although the extent of the impact of infections by intracellular agents on olive production is unknown, dismissing viral problems of olive as negligible, on the grounds that infections are quite often symptomless and that olive has grown for time immemorial without apparent suffering, may not be wise. The appearance of what look like vector-supported outbreaks of severe virus-induced leaf-yellowing syndromes and of phytoplasma-induced yellows is alarming. The outbreaks presently recorded are limited in number and relevance, but these are not good reasons to overlook them. The real problem resides in the deplorable lack of information on the prevalence and distribution of viruses and phytoplasmas and their mode of spread in nature, which would be essential for successful control.

As with other plant viruses, the implementation of preventive measures, whose pillars are sanitary selection and sanitation, seems to be the only sensible strategy to restrain spread of olive viruses. Sanitary selection is best performed in the framework of certification schemes encompassing also pomological selection for varietal conformity and superior quality traits. However, sanitary selection based only on visual examination is insufficient, owing to the widespread occurrence of latent infections. Field selection must therefore be accompanied by laboratory testing, the most effective of which is, at present, dsRNA analysis. This test is quick and
reliable, so that infected selections can be promptly identified and discarded, or set aside for further studies or treated.

There is no published record of the use with olive of procedures commonly used with other woody crops for virus elimination (e.g., heat therapy, meristem tip culture, micrografting). Heat therapy has been tested in Israel, but the outcome of the treatment has not been assessed yet (S. Lavie, pers. comm.). However, many olive cultivars can now be readily propagated in vitro and regenerated by organogenesis and somatic embryogenesis (Rugini, 1997). This opens new, exciting perspectives for successful sanitation treatment. Trials along these lines are now under way in Italy.

As to legislative regulations currently enforced for the improvement of the olive industry, a scheme for the voluntary certification of olive in Italy was licensed by the Italian Ministry of Agriculture in 1993 (Quacquarelli & Savino, 1997). According to local laws, certified nursery production must be true to type and free from the olive pathogenes responsible transmits by the material of propagation (Pseudomonas savastanoi). Verticillium dahliae and six different viruses (ArMV, SLRSV, OLRSV, CLRV, CMV, and OLV-1). This scheme is operative, and the first certified products are now being released in Fuglia.

The Italian scheme was issued at about the same time as the European Union Directive 93/48 on the Conformitas Agraria Communis (CAC) for olive, specifying the organisms detrimental to the quality of the crop. These organisms are insects (Saissetia oleae), mites (Eusephora pinguis), nematodes (Meloidogyne spp.), bacteria (P. savastanoi and Agrobacterium tumefaciens), fungi (V. dahliae) and all viruses.

This CAC is too restrictive and difficult to apply, especially with reference to viruses. On the basis of current knowledge, the generic indication that all viruses are detrimental to olive quality is misleading and scientifically untenable for two reasons: (i) the word ‘all’ inevitably leads to the inclusion in the list of those viruses that may occur in olive (who knows how many?) but have not yet been identified; (ii) there is no evidence that all viruses are detrimental to olive. In fact, as discussed above, it has not yet been ascertained with certainty which of the currently known viruses are true pathogens and the diseases that they elicit.

A better knowledge of the actual situation would be desirable when durable decisions are made at the EU level. (Who dares to propose the modification of a recently issued EU Directive?) Wrong moves, such as the one in question, may cripple, instead of helping, a given agricultural industry (olive nurseries in this instance), are difficult to enforce and may raise the level of litigation and legal controversy. In the end, such hasty decisions are not to the benefit of the rural world.

Maladies infectieuses et certification de l’olivier: vue d’ensemble
Les maladies de l’olivier (Olea europaea var. sativa) et les pathogènes responsables transmis par le matériel de propagation sont présentés, avec une référence particulière aux virus et aux phytoplasmes. 14 maladies virales ou analogues ont été décrites jusqu’à présent, et 12 virus et 5 phytoplasmes ont été identifiés dans des plantes présentant des symptômes ou non. Une brève description des maladies est donnée, ainsi que des informations sur l’épidémiologie et le diagnostic. Les solutions possibles, telles que la sélection sanitaire, les procédures d’amélioration sanitaire et la mise en oeuvre de schémas de certification sont discutées.

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