

Recommendation of the Working Group on the Annexes of the Council Directive 2000/29/EC – Section II – Listing of Harmful Organisms as regards the future listing of *Ditylenchus dipsaci* (Kuhn) Filipvejev¹

Current regulatory status

Ditylenchus dipsaci is currently regulated in Annex IIAII (a.4) of Council Directive 2000/29/EC on seeds and bulbs of *Allium ascalonicum* L., *Allium cepa* L. and *Allium schoenoprasum* L., intended for planting and plants of *Allium porrum* L., intended for planting, bulbs and corms of *Camassia* Lindl., *Chionodoxa* Boiss., *Crocus flavus* Weston ‘Golden Yellow’, *Galanthus* L., *Galtonia candicans* (Baker) Decne, *Hyacinthus* L., *Ismene* Herbert, *Muscari* Miller, *Narcissus* L., *Ornithogalum* L., *Puschkinia Adams*, *Scilla* L., *Tulipa* L., intended for planting, and seeds of *Medicago sativa* L.

Specific requirements for the introduction and movement within the Union of bulbs of *Tulipa* L. and *Narcissus* L. are listed under Annex IVAI(30) and Annex IVAII (22) as well as for *Medicago Sativa* seeds (Annex IVAI 49.1 and Annex IVAII 28.1).

Plant passport requirements are listed under Annex VAI (point 2 and point 3) for specific host plants, including phytosanitary certificate under Annex VBI.

Relevant host plants are also listed under several Marketing Directives:

- *Allium cepa* L., *Allium porrum* L., *Allium schoenoprasum* L. under Council Directive 2008/72/EC on the marketing of vegetable propagating and planting material, other than seed;
- *Medicago sativa* L. under Council Directive 66/401/EEC on the marketing of fodder plant seed; and
- Ornamental plants including bulb, corm, rhizome and tuber forming plants under Council Directive 98/56/EC on the marketing of propagating material of ornamental plants.
- *Ribes* and *Fragaria* under Commission Implementing Directive 2014/98/EU of 15 October 2014 implementing Council Directive 2008/90/EC as regards specific requirements for the genus and species of fruit plants referred to in Annex I thereto, specific requirements to be met by suppliers and detailed rules concerning official inspections;
- *Allium ascalonicum*, *Allium cepa*, *Allium fistulosum*, *Allium porrum*, *Allium sativum* under Council Directive 92/33/EEC of 28 April 1992 on the marketing of vegetable propagating and planting material, other than seed;
- *Gladiolus* under Commission Directive 93/49/EEC of 23 June 1993 setting out the schedule indicating the conditions to be met by ornamental plant propagating material and ornamental plants pursuant to Council Directive 91/682/EEC.

Identity of the pest

D. dipsaci is a single taxonomic entity. It is a migratory endoparasite nematode that is harmful to a broad range of hosts (at least 500 plants, belonging to around 50 different botanical families). The

¹ Scientific basis for the recommendation: Pest Risk Assessment prepared by France

most affected cultivated plants are bulb plants (flower or vegetable crops), *Fabaceae* (including alfalfa), and certain *Poaceae*.

A high level of variability has been observed in the range of hosts for *D. dipsaci* populations. Around thirty "host races" have been described within the species, depending on their preferential host. Some of them are more polyphagous (Onion, Tulip races) than others (alfalfa).

D. dipsaci can be identified in the laboratory by morphobiometric or molecular analysis (multiplex PCR, real time PCR) of individuals but at present, the different races cannot be differentiated using these methods. Methods of extraction and identification from alfalfa seeds have been developed (EPPO 2008). It is likely, however, that *D. dipsaci* is not detected by inspection procedure in case of low infestation.

Distribution of the pest

D. dipsaci is a ubiquitous and cosmopolitan nematode that has been reported on all continents and at all latitudes corresponding to its climatic requirements, i.e. wet, cool conditions. Known in Europe since the 19th century, it has been reported across all EU Member States, apart from Luxembourg. *D. dipsaci* is therefore widely distributed in the PRA area.

The majority of the cultivated host species are present in the PRA area, along with numerous wild host species.

Potential for establishment and spread in the PRA area

D. dipsaci is liable to become established throughout the PRA area. Given the current widespread distribution of *D. dipsaci* in the PRA area, the climate (favourable to the nematode in the entire PRA) and distribution of host plants (numerous host plants are present in the PRA), the probability of establishment is judged to be high. The biology of the nematode is favourable to its establishment: the fourth larval stage of the nematode is resistant to host plant absence, enabling the parasite to survive for long periods in the soil (for up to two years) and numerous generations can be observed during a vegetative cycle. Cropping practices (rotations, chemical treatment of soil destined for planting (bulb flower crop)), and the usage of resistant varieties (only for alfalfa) can limit its establishment.

Thanks to its desiccation capacity, *D. dipsaci* is able to remain viable in or around seed (grain or bulbs). It is spread mainly via seed, plant debris associated with seed and contaminated bulbs.

Spread by natural means (movement through soil, run-off of water, wind) or via human assistance (agricultural machinery, farm scale) is likely, but would occur at a limited rate.

Potential for consequences in the PRA area

The entire PRA area is at risk of an economic impact. Where the soil and climate conditions are conducive, the potential impact of *D. dipsaci* in the absence of phytosanitary measures and practices is significant. The impact of *D. dipsaci* observed on alfalfa fodder crops concerns yield losses (limited to significant depending on soil, climate areas and varieties). The impact of *D. dipsaci* depends on the regions, with southern Europe, in particular, being less affected. The presence of the nematode on seed also causes significant commercial damage due to the risks to the next crop. In alfalfa seed crops, the impact observed is related to the rejection of contaminated seed lots that cannot be marketed.

For vegetable and flowering *Liliaceae*, plants or plant parts harvested from plants affected by this nematode cannot be sold because of reduced aesthetic appearance, size and/or reduced conservation. For vegetable *Liliaceae*, the damage can vary from a few plants being affected to the entire field being abandoned. Bulb vegetables must be completely free of *D. dipsaci*, otherwise their movement and sale may not be authorised within Europe. In France, *D. dipsaci* has no economic impact on bulb flowers due to preventive and systematic soil treatments using Vydate (oxamyl).

On alfalfa, symptoms of stem swelling and dwarfism following shortening of the internode length are observed on affected plants. In severe cases, infestation can kill the plant. Nematodes are released and invade neighbouring alfalfa plants, with the development of a patch or area where the vegetation is reduced. Symptoms can be difficult to observe in the field on resistant varieties.

The effects of *D. dipsaci* on vegetable and floral Liliaceae consist of yellowing and deformation of the leaves, a reduction in internode length, leading to dwarfism of the plant. Delayed flowering is also observed in daffodils, while the tepals of tulips are deformed and discoloured. Compared to healthy garlic bulbs, infected garlic bulbs are smaller, present a damaged skin and cloves and do not keep well.

Recommendation

D. dipsaci does not qualify as a Union quarantine pest. It has been reported in all MS except Luxembourg and eradication is no longer feasible.

However, considering the potential damage caused by *D. Dipsaci* and its potential economic impact on the intended use of plants for planting, the Working Group recommends listing this organism as Regulated Non-Quarantine Pest.

Elements of further considerations

Discussion on current requirements for Luzern (Annex IVAI 49.1 and Annex IVAI 28.1):

- Option a) is considered to be limited by the difficulty of detecting symptoms in the field on resistant varieties, and by sampling and detection test limits. Hence, in the event of low infestation, it is possible that *D. dipsaci* may not be detected using inspection procedures;
- Option b) methyl bromide is no longer available for fumigation.

Indications for possible phytosanitary measures to further develop:

- Heat treatment of bulb vegetables and bulb flower crop is an effective - albeit optional - control method against *D. dipsaci*.
- With respect to bulb flower crops, systematic treatment of soil destined for planting with tulips, daffodils and hyacinths with Vydate (oxamyl) at a dose of 20 to 40 kg/ha is the most widely used strategy in France.
- For alfalfa seeds: The following measures enable a reduction in the percentage of contaminated seed lots and the number of nematodes per contaminated lot:
 - inspection of seed multiplication fields
 - cultivation of varieties with a high level of resistance
 - implementation of a certification scheme
 - production of seed in pest-free fields
 - sampling and testing of seed lots
 - elimination of plant debris associated with the seed
 - physical treatment: thermal treatment (being developed), brushing
- The implementation of a certification scheme consists in a combination of measures involving rotations, inspection of seed multiplication fields, testing of seed.
- Agricultural measures

- Management measures such as long crop rotations, the elimination of weeds and plant debris, and late planting dates may help reduce the population of *D. dipsaci* in soils and hence the impact on crops.
- Selection for potential resistance to *D. dipsaci* (non-existent for vegetable and flowering *Liliaceae*).