◆ EPPO Standards ◆

GUIDELINES ON *ARTHURDENDYUS TRIANGULATUS*

NURSERY INSPECTION, EXCLUSION AND TREATMENT FOR *ARTHURDENDYUS TRIANGULATUS*

PM 1/4

European and Mediterranean Plant Protection Organization
1, rue Le Nôtre, 75016 Paris, France
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APPROVAL

EPPO Standards are approved by EPPO Council. The date of approval appears in each individual standard. In the terms of Article II of the IPPC, EPPO Standards are Regional Standards for the members of EPPO.

REVIEW

EPPO Standards are subject to periodic review and amendment. The next review date for this EPPO Standard is decided by the EPPO Working Party on Phytosanitary Regulations.

AMENDMENT RECORD

Amendments will be issued as necessary, numbered and dated. The dates of amendment appear in each individual standard (as appropriate).

DISTRIBUTION

EPPO Standards are distributed by the EPPO Secretariat to all EPPO member governments. Copies are available to any interested person under particular conditions upon request to the EPPO Secretariat.

SCOPE

The earthworm predator *Arthurdendyus triangulatus* (synonym *Artioposthia triangulata*[1]) has a restricted geographical distribution in the EPPO region. It is recognized that certain EPPO Member Governments may seek to prevent its introduction and spread because it may have an effect on earthworms; this effect could be considered damaging to the environment and it may have consequences for the horticultural trade and for agricultural/horticultural production, especially organic farming. At present, the regulatory basis for taking measures to prevent introduction and spread of this organism is not clear, because it is not a direct pest of plants and its potential agro/environmental impacts are difficult to assess. Where action is considered desirable, EPPO Governments should determine whether a regulatory approach is justified and, if so, the most appropriate legal framework and enforcement agency. The EPPO standards on *A. triangulatus* propose measures that may be taken by EPPO Member Governments.

REFERENCES

IPPC (1999) *Glossary of Phytosanitary Terms.* ISPM no. 5. IPPC Secretariat, FAO, Rome (IT).

OUTLINE OF REQUIREMENTS

The most probable pathway for introduction and spread of *A. triangulatus* into new areas is with consignments of container-grown nursery plants (i.e. plants grown in growing medium and, usually, in plastic containers). While such container-grown plants can be directly inspected at points of entry or places of destination, a higher degree of security can be ensured if measures are taken at the place of production. It is proposed that importing countries may require such measures to be applied by exporting countries. Details are provided on a number of alternative requirements which may be made, and on the procedures to be followed at the place of production to satisfy these requirements.

[1] This species was transferred to a new genus as the type species (Jones, H.D. & Gerard B.M. (1999) A new genus of terrestrial planarian (Platyhelminthes: Tricladida; Terricola) from Scotland, and an emendation of the genus *Artioposthia*. *Journal of Natural History* 33, 387-394).

EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANIZATION
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Guidelines on *Arthurdendyus triangulatus*

NURSERY INSPECTION, EXCLUSION AND TREATMENT FOR *ARTHURDENDYUS TRIANGULATUS*

Specific scope

This standard is designed to help official services and producers of nursery stock to detect and, thereby, to limit the spread of *Arthurdendyus triangulatus*. Careful inspections of plants and the use of appropriate hygienic practices can ensure that container-grown plants moved from a place of production are free from the organism.

Specific approval and amendment

First approved in September 2000.

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1. Identification

Adult *Arthurdendyus triangulatus*[2] is flat and has a smooth but sticky skin. It has a purple/brown upper surface, pale brown-coloured margins and a speckled underside. It is usually about 1 cm wide and 5 cm long, but stretches to 10-15 cm when it is moving. Large specimens can extend beyond 20 cm. Flatworm egg capsules are black and appear in late spring to early summer, changing from red to black within 24 h of laying. They resemble fruits of blackcurrant (*Ribes nigrum*) and are 4-11 mm long and 3-8 mm wide. Six to ten juvenile flatworms or hatchlings emerge after about a month and are creamy white or yellow in colour.

The adults and egg capsules of this exotic species are generally not familiar to personnel working for official services, nurserymen or traders. They are liable to be confused with other naturally occurring animals such as leeches (Hirudinea) or indigenous European flatworms. Pictorial guides are available to assist identification.

Suspect specimens should, if necessary, be sent to the appropriate authority, with details of the time, place and nature of the discovery. Care is needed in doing this, since *A. triangulatus* is delicate and often disintegrates at temperatures above 20°C. Specimens (adults or egg capsules) should be sent in a crush-proof container either preserved in 30% alcohol or live with damp moss or fresh moist grass sufficient to fill the container but not too tightly. If necessary, a chilled and insulated container should be used. It should be noted that the mucus secretions of flatworms may cause skin irritation, so they should not be handled with bare hands.

[2] *Austroplana sanguinea* (Australian flatworm) is a related species which is smaller than *A. triangulatus*, measuring 3-8 cm, although this depends on the degree of extension. Its colour varies from cream to peach to mid-brown, often with a distinct red tinge near the head.

2. Inspection for *Arthurdendyus triangulatus*

Flatworms are normally found on the soil surface. During the day, they seek shelter in dark damp places, such as under loose clumps of soil, plastic or other sheeting, rocks, flat stones, plant pots, trays and other containers. Egg capsules can also be found in such places.

Where pots, trays or other containers stand on black polythene or capillary matting, the underside of the polythene or matting should frequently be checked for the presence of the flatworm. Where pots, trays or other containers stand directly on the ground, flatworms may hide directly under the container. The inspector should check whether flatworms can be found on the ground surface below the pot, tray or other container, or have adhered to the underside of it.

Flatworms and their egg capsules can also be found inside plant pots, trays or other containers between the root ball and the edge of the container. Plants should be lifted periodically from the container to check for the presence of flatworms.

Flatworms may occur in the immediate vicinity of the place of production, e.g. in private gardens, particularly in urban areas, or in any suitable habitat. If this possibility arises, traps should be set close to the boundary of the place of production, and should consist of black polythene bags part-filled with sand or soil placed on the soil surface (or else weighted-down sheets of black plastic or planks of wood). The underside of these traps should frequently be checked.

Flatworms are most likely to enter an uninfested place of production with plant material brought in from outside. Incoming consignments of plants in pots or

trays should be carefully inspected, particularly if they come from an area where findings of *A. triangulatus* have been reported. Similarly, material moved from one part of the place of production to another should be checked for presence of flatworms.

Finally, all plants grown in pots, trays and other containers (including root-balled plants) moved from the place of production to other localities, particularly in the form of consignments for export to other countries, should be carefully inspected for presence of *A. triangulatus*.

3. General measures at places of production

General hygienic methods should be used at the place of production to reduce the risk of survival and multiplication of *A. triangulatus*. Flatworms require suitable refuges in which to hide, and the main aim of general hygiene is to remove such refuges, especially by:

- removing piles of plant waste and soil (e.g. open compost heaps);
- avoiding, where possible, placing stones or bricks as borders or paths;
- not leaving undisturbed stones near buildings or shrubs. Such stones should regularly be lifted and the underlying soil turned over.

All growing media and composts used in pots, trays and other containers should be brought in pest-free, or should be disinfested by heat treatment to normal commercial standards (e.g. 80°C+ for 10 min). They should be stored in bins clear of the soil surface, and protected from the entry of flatworms. Growing media or composts should not be re-used without treatment, especially in places of production where flatworms have been found.

4. Specific measures to prevent the spread of *Arthurdendyus triangulatus* within places of production

If *A. triangulatus* has been found in a place of production, it may be possible to eliminate it or to maintain part of the place of production free from the flatworm.

The whole place of production should be intensively and rigorously inspected using the methods set out in section 2. If any part is found to be infested, the infested and uninfested parts should be clearly delimited. The main purpose of this section is to indicate measures to prevent entry of the flatworm into the uninfested parts. As appropriate, measures may be undertaken to eliminate the flatworm from infested parts.

The uninfested parts should be regularly inspected. All possible flatworm refuges should be eliminated, and only pest-free growing media should be used (section 3). The movement of rooted plants and soil between parts of the place of production should be minimized, and none should be moved from the infested parts unless they are free from soil, or have been treated as in section 5. Traps should be set at the boundaries of the uninfested parts and frequently checked. Sharp 15-20 mm stone chips or gravel may be placed at the boundaries to deter flatworms. All outgoing consignments of plants grown in pots, trays and other containers from the uninfested parts should be carefully inspected.

Alternatively, if uninfested parts cannot adequately be maintained, plants should be grown in pots, trays or other containers on raised benches (slatted or open-meshed).

5. Treatments

Destruction of flatworms or eggs

All flatworms or egg capsules discovered should be destroyed (apart from any specimens sent for identification). There are no specific chemical products approved to destroy flatworms directly, or to control them by application in places where they are active. Individual flatworms or egg capsules can be killed by dropping into hot (>40°C) water, or sprinkling with sodium chloride.

The commercial treatments used to "sterilize" growing media and composts (e.g. 80°C+ for 10 min) are effective against flatworms.

Disinfestation of plants grown in pots, trays and other containers

Possibly infested plants can be disinfested by:

- removal of the pot, tray or other container and soil from the root ball followed by re-potting in a clean "sterile" pot, tray or other container and growing media;
- immersing the pot, tray or other container and root ball in warm water (>34°C) for a minimum of 10 min (alternatively >30°C for 40 min). Such a treatment should not be carried out with plants at ambient temperatures below 15°C;
- placing the plants in a warm environment (at least 26.5°C for 24 h or 30°C for 12 h).

After treatment, all disinfested plants should be protected from reinfestation, for example by holding them on raised benches (slatted or open-meshed) with a free circulation of air.