ORGANISATION EUROPEENNE ET MEDITERRANEENNE POUR LA PROTECTION DES PLANTES
EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANIZATION

Joint EPPO / COST-SMARTER Workshop on the Evaluation and Regulation of the use of Biological Control Agents in the EPPO Region (Budapest, 2015-11-23/24)

Case studies

Case study 1: Nematode biocontrol agent for the control of *Tuta absoluta*

The tomato borer, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) is a significant pest of tomato crops (*Solanum lycopersicum*) within the EPPO region where it can cause significant yield loss. *T. absoluta* originates from South America and was detected for the first time in Europe in Spain in 2006. Since this introduction, *T. absoluta* has spread rapidly along the Mediterranean basin and to other central and northern European countries.

Tuta absoluta is multivoltine with a high reproductive capacity which allows the population to increase quickly. Females can lay up to 260 eggs during their lifetime which are deposited on the plant canopy. Larvae mine into the plant and develop through four instars before pupation. Depending on environmental conditions, the life cycle is completed between 24 and 76 days.

All stages of tomato plants can become infested with up to 100 % yield losses in severely infested cropping systems. The main damage is produced on the leaves and fruit though stems and the inflorescence can be affected.

Under scenario we are considering the biological control of *T. absoluta* using an indigenous nematode with a restricted distribution in Europe. The nematode has been identified at the species level. Commercial augmentative biological control techniques will be applied which can be utilized across the region if initial trials prove successful.

Based on this scenario answer the following questions:

Which legislation applies to this scenario?

Which international or regional standards are relevant?

What additional information is needed to make a decision?

In what format should that information be provided and by whom?

Who carries out the analysis and using what methodology?

Who evaluates the analysis?

Who should make the decision and who should be consulted?

Case study 2: Predatory mite biocontrol agent for the control of *Drosophila suzukii*

Drosophila suzukii (Matsumura) (Diptera: Drosophilidae) is an economically important pest of small soft fruits. Native to Asia, *D. suzukii* was first observed within the EPPO region in 2009. *D. suzukii* has a wide host range and can attack many fruit crops, including small fruit crops, fruit trees and grapevine.

Under ideal conditions *D. suzukii* has up to 15 generations per year and its life cycle can be as short as 10 days. The females actively search for ripening host fruits. The eggs are laid in the fruit where the larvae subsequently develop. Pupation occurs in the fruit or in the soil. *D. suzukii* overwinters as an adult in sheltered places but under suitable conditions it can be active all-year-round. Flies are active above 10ºC.

D. suzukii is one of the very few *Drosophila* species which are able to feed on healthy ripening fruit while they are still attached to the plant. Damage is caused by larvae feeding on fruit pulp inside the fruit and berries. Very rapidly, infested fruit begin to collapse around the feeding site. Thereafter, secondary fungal or bacterial infections may contribute to further fruit deterioration (i.e. rotting). In the USA, severe losses have been reported in cherry production in California (estimated at 25% state-wide in 2009). Several berry growers in California, Oregon and Washington, and peach growers from Oregon have reported up to 100% crop losses in some fields.

Under this scenario we are considering the biological control of *D. suzukii* using a predatory mite which was found feeding on *D. suzukii* eggs during a survey for natural enemies in its native range. The mite has been identified and a dossier has been produced detailing all aspects of its biology, ecology and host range.

<u>Based on this scenario answer the following questions:</u>

Which legislation applies to this scenario?

Which international or regional standards are relevant?

What additional information is needed to make a decision?

In what format should that information be provided and by whom?

Who carries out the analysis and using what methodology?

Who evaluates the analysis?

Who should make the decision and who should be consulted?

<u>Case study 3: Hymenoptera parasitoid agent for the control of *Agrilus planipennis*</u>

Agrilus planipennis Fairmaire (Coleoptera: Buprestidae) originates from Far-East Asia and is primarily a pest of *Fraxinus* (ash). It was detected in North America (USA and Canada) in 2002 and in the European part of Russia (Moscow region) in 2005. It is a serious pest of *Fraxinus* where it has been introduced outside its native range. It has caused extensive ash mortality in North America and in the Moscow area and is spreading in all introduced areas.

Agrilus planipennis normally oviposits on live trees; it has been observed to occasionally oviposit on freshly cut ash logs, although larvae emerging from such eggs rarely complete their development. There are four larval instars. First-instar larvae tunnel through the bark to the cambium. Larvae then feed in the inner bark and outer sapwood. They produce galleries (up to 26-32 cm long), which are S- shaped and filled with frass. Pupal cells are located in the outer sapwood or in the outer bark, at the end of the larval gallery. When the bark is thin, pupae are predominantly found in the sapwood. However, when the bark is thick, more pupal cells are located in the outer bark. After eclosion, the adults remain under the bark for 1-2 weeks ("callow adults") and then exit through D-shaped holes. Adult emergence usually begins after accumulation of 230-260 degree-days base 10°C.

All life stages (except adults) are hidden (eggs in bark cracks; larvae, prepupae and pupae in the bark or sapwood, callow adults in the bark or sapwood), making their detection difficult. Infested trees do not present clear symptoms until they are heavily attacked. Symptoms may not be noticeable for 2-3 or more years after initial attack, particularly if the infestation begins in the upper part of the tree. Although D-shaped exit holes produced by emerging adults are present after the first year of infestation, they may be few in number and they are usually initially situated high in the canopy (i.e. not easily visible) on larger trees. First emergence, and therefore the appearance of D-shaped holes, will be delayed if the individuals develop over more than one year.

Under this scenario, a parasitic hymenoptera has been collected from the native range of the pest and scientists tentatively identified the species to facilitate its import into quarantine. Apart from this no additional research has been conducted.

Based on this scenario answer the following questions:

Which legislation applies to this scenario?

Which international or regional standards are relevant?

What additional information is needed to make a decision?

In what format should that information be provided and by whom?

Who carries out the analysis and using what methodology?

Who evaluates the analysis?

Who should make the decision and who should be consulted?

Case study 4: Fungal biocontrol agent for the control of *Ambrosia artemisiifolia*

Ambrosia artemisiifolia L. (Asterales: Asteraceae) is an introduced exotic pest for the EPPO region. It is a serious weed mainly because of its prolific seed production. Once established in an area, even if relatively well controlled on agricultural land, this weed can build up large populations on wasteland, and along roadways and waterways. Populations are difficult to control and in particular give rise to human health problems (hay fever, dermatitis). In North America, where it is native, *A. artemisiifolia* is managed as part of the natural weed flora. In the EPPO region, it is already fairly widespread in western Europe, occurring more commonly in the warmer regions in the south.

A. artemisiifolia is an annual weed, reproducing by seeds. One plant may develop 30,000-40,000 seeds which can remain viable for 5-14 years. On heavily infested plots, the population density can reach 500 plants per m^2. Seeds germinate in warm and well aerated soil.

Ambrosia competes strongly with crop plants for water and nutrients. It rapidly impoverishes the soil. It can seriously reduce yields of cereals and other field crops (e.g. sunflower), and causes problems in harvesting. Its presence greatly reduces the fodder quality of meadows and pastures (ambrosia is not palatable to livestock), and taints dairy products if cattle do feed on it. In addition, the pollen of *A. artemisiifolia* is strongly allergenic causing serious hay fever in infested areas. The plant also causes dermatitis on contact.

Under this scenario, a fungal pathogen has been collected from the plant's native range and its life cycle has been evaluated where it has been shown to be autoecious. Host range testing has confirmed the species is specific to the target plant. From the results of laboratory experiments, the most suitable mode of application for this pathogen has been shown to be a mycoherbicide approach, where the formulation promotes spore germination and adherence to the leaf surface.

Based on this scenario answer the following questions:

Which legislation applies to this scenario?

Which international or regional standards are relevant?

What additional information is needed to make a decision?

In what format should that information be provided and by whom?

Who carries out the analysis and using what methodology?

Who evaluates the analysis?

Who should make the decision and who should be consulted?