



Agriculture & Horticulture  
DEVELOPMENT BOARD



# Grower Summary

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## PE 002

Development rate of *Tuta absoluta* under UK glasshouse conditions

Final Report 2011

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## **Further information**

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## Headline

- New information on the development of *Tuta absoluta* will assist in the development of IPM programmes for glasshouse tomatoes

## Background

*Tuta absoluta* is currently the most damaging pest of tomato crops in the Mediterranean basin and has completely destroyed some crops in southern Spain (Jacobson and Morley, 2010a). When it was first found in the UK in 2009, British growers were concerned that they would suffer similar catastrophic losses. At that time, there were no known control measures that were both effective against *T. absoluta* and compatible with the biological control agents used successfully against other tomato pests in the UK. Since then, another HDC project (PC 302) has developed an effective contingency plan (Jacobson and Morley, 2010b). However, that project also identified important gaps in the knowledge of the biology and behavior of *T. absoluta* which were constraining the further development of integrated control strategies. Many of those gaps have been addressed in the present study.

The main concern of British growers now relates to disruption of supplies to customers. If larvae of *T. absoluta* are detected inside tomato fruit by retailers or consumers, then the produce will be rejected and it is highly likely that further supplies from that source will be put on hold until the grower can provide assurance that the infestation has been completely controlled (Jacobson, 2010a). It will be very difficult for the grower to find another outlet for that produce at short notice and this could result in very large quantities of produce being dumped. The financial loss could be over £300k per hectare per season depending on the time of year that the infestation is first detected (Jacobson, 2010b). Elimination of this risk will require further fine tuning of the IPM programme (Jacobson and Morley, 2010c). This work is progressing in a continuation of HDC project PC 302 but its success will be dependent on the outcome of the present studies.

## Summary

The tomato leafminer *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) is a major pest of tomato plants in South America. Since 2006 it has been detected in several European countries where much damage to crops has been reported (EPPO, 2008). It was first recorded in the UK in 2009 where it was subjected to a policy of eradication. *Tuta absoluta* has the potential to cause devastating effects on UK tomato crops should it become established. Information on many aspects of the general biology and population development of *T. absoluta* is lacking. In the current work the population development of *T. absoluta* was determined under various UK glasshouse temperatures.

- The optimum temperature from the current study for *Tuta absoluta* development ranged from 19 - 23°C. At 19°C, there was 52% survival of *T. absoluta* from egg to adult.
- As the temperature increases above 23°C the development time of the moth appears to decrease. This may well make *T. absoluta* better suited for UK glasshouse conditions compared to hotter Mediterranean climates.
- Population development ceases between 7 and 10°C. Only 17% of eggs hatched at 10°C but no larvae developed through to adult moths. However, this does not mean that the population will always die out. No eggs hatched when maintained at 7°C. Data on low temperature survival is essential.
- Under laboratory conditions the total lifespan of the moth was longest (72 days) at 13°C and shortest (35 days) at both 23 and 25°C. The physiological age of insects is known to increase more slowly at lower temperatures. Personal observation noted that moths at lower temperatures were less easily agitated.
- Development from egg to adult took 58 days at 13°C; 37 days at 19°C and 23 days at 25°C.
- High mortality of larval stages occurred under all temperatures tested. Under field conditions the egg stage would also be a highly vulnerable life-stage being readily open to attack from predators.

- Under laboratory conditions, first instar larvae were exposed on the leaf surface for approximately 82 minutes before fully tunneling into the leaf. This was a lot less than what was anticipated from unsubstantiated reports, where as long as 24 hours was thought to be the time first instar larvae spend on the leaf surface.
- Adult longevity was highest at 10°C with adult moths living for 40 days (when supplied with a food source) and lowest at 19°C where they survived for 16 days. Again, this could be related to physiological age and less activity at the lower temperatures.
- Our study determined that in general more males than females are produced (although more or less a 1:1 ratio is maintained).

*Tuta absoluta* has huge potential to establish populations within the UK protected horticulture industry. Understanding the population development of the pest under specific conditions will aid in the formation and application of integrated control strategies against the pest.

## **Financial Benefits**

The British Tomato Growers' Association recognized that this project in isolation will not provide immediate financial benefits. However, the results will form an important part of a bigger package that will ultimately allow growers to minimise losses caused by this pest. The overall control package will also allow them to continue to use their IPM programme and thereby retain a competitive advantage over their competitors in southern Europe.