CRA-W NEWS

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The sinuate pear tree borer keeping a low profile

For nearly ten years now the sinuate pear tree borer (*Agrilus sinuatus* Ol.), a wood-boring insect, has infested fruit and ornamental nurseries in the Walloon region, causing withering and sometimes killing its pear tree hosts. The Netherlands and Germany were already infested by 1992. More recently the pest has spread to commercial fruit crops and private gardens in Flanders, Wallonia and Northern France, probably through the medium of nursery plants.

In standard tree nurseries almost all the plants (90%) are likely to be affected by this pest and many deaths can occur. The damage to young pear tree plantations is often such that the plants have to be replaced. In older orchards the attacks, though sometimes spectacular, do not necessarily kill the trees, but tend to cause slow decay. As the name suggests, this insect's main host is the pear tree (*Pyrus communis*) but it may also occur in hawthorn (*Crataegus* sp.), mountain ash (*Sorbus* sp .), medlar (*Mespilus germanica*) and the quince tree (*Cydonia oblongua*). So far it has been observed on the first three of these species in this region, namely cropping and ornamental pear trees, hawthorns growing in the wild and rows of mountain ash.

The sinuate pear tree borer spends most of its life in the larval state under the tree bark, where it hollows out a long, spiralling gallery on the surface of the wood. This gallery, undetectable initially, cuts off the sap flow, thus withering part or all of the host plant. Ultimately, the gallery also leads to the formation of the characteristic cankers on the trunk or limbs of the tree, which are often confused with those due to fire blight. The adult insect is difficult to observe and leaf biting is insignificant. This explains why the damage done by this pest often goes unnoticed and its presence undetected. In our part of the world it has a two-year life cycle over three calendar years, but the hot summers that have triggered its reoccurrence may shorten the cycle.

Work on the current spread of the sinuate pear tree borer began at CRA-W in 1997, concentrating on the nursery sector initially. The main objective is to detect the adult insect in order to determine its activity curve in this region and devise an appropriate control method. Various attempts at trapping have been in vain. Monitoring adult emergence from the cankers, on the other hand, has to date proved to be the only suitable method for determining the insect's flight curve accurately. This original method, which has been in use for several years now in cooperation with the Walloon Regional Horticultural Testing Centre (CEHW), enables nurserymen to be alerted to the most favourable time for phytosanitary treatment. Tested in productive orchards in 2005 the method, although tedious, has proved to be equally effective for monitoring borer activity and issuing control warnings to fruit growers in the Walloon region and also in France, through GAWI, PROFRUIT and FREDON (Nord Pas-de-Calais).

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Omega-3 fatty acids: towards more effective control of the dietetic and technological quality of duck foie gras

Force-feeding ducks and geese to produce foie gras makes use of migratory birds' natural capacity for hepatic lipid storage. Foie gras is thus the result of a physiological fatty liver which is reversible rather than pathological. Half of foie gras consists of lipids, stored essentially in triglyceride form. These triglycerides are rich in monounsaturated fatty acids (FA), with over 50% oleic acid, and contain very few polyunsaturated fatty acids (<3% of total FA).

The main technological quality criterion for foie gras is lipid rendering (or rendering rate), the result of fat separation from the liver due to the effect of heat (pasteurisation and sterilisation). Lipid rendering is therefore detrimental to both the appearance and the taste of foie gras. Making the hepatic cell membranes more flexible in order to improve their resistance to cell hypertrophy due to fat storage would offer a solution to this major technological problem facing foie gras producers. This objective could be attained by omega-3 supplementation, assuming this fatty acid to be deposited chiefly in the cell membrane phospholipids. To test this hypothesis, a trial was conducted with two groups of 280 Mulard ducks which were fed either the force feed alone (maize grain mash) or force feed containing 2% extruded linseed (source of omega-3).

The addition of approximately 2% of extruded linseed to the duck feed for 13 days of force-feeding was sufficient to enrich the meat (thigh and breast) naturally with omega-3, a fatty acid beneficial to human health. This fatty acid also increases in the liver tissues, but in smaller proportions. The rendering rate of rolls of foie gras measured on the day of slaughter of the ducks was lower in the case of the linseed group (0.5 vs 3.5% for the control group). After 24 hours, the rendering rate increases perceptibly in the case of both groups of livers but the initial three-point difference remains (9.7 vs 12.8% for the linseed and control groups respectively). This trend has also been confirmed by a laboratory rendering rate measurement. These results therefore appear to verify our assumption that the lipid rendering rate can be lowered by adding a food source of omega-3. However, the composition of the hepatic cell membrane phospholipids will have to be analysed in order to back up this hypothesis. Further research is therefore necessary to confirm these results and refine the method.

This trial was conducted by CRA-W in close cooperation with Messrs Delmotte and Fameree of D33, Regional Government of Wallonia. We should like to thank Mr Petit of UPIGNAC S.A. at Upigny for kindly allowing this study to be carried out, Miss Bedoret for her technical and logistical assistance and Mr Malotaux for force-feeding the ducks. The fatty acid pattern analyses were performed by RU Ghent and the laboratory rendering rate measurement by FUSAGx (Technology Unit).

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Stop separation!

Bulk blending of fertilizers has been practised for many years. The technique involves mixing various solid granular fertilizers together to produce a compound formulation suited to the needs of the crop. Compared to complex compound fertilizers, in which each particle contains all of the nutrients, this method is more economical, very flexible (customised formula) and inventory management is limited to the raw materials. The chief drawback is the risk of separation of the components of the blend, which totally undermines the attractiveness of the technique.

Quality criteria therefore need to be established for the blended substances in order to overcome this problem.

A large-scale study has accordingly been undertaken with the support of the Belgian Federal Science Policy Office, the European Blenders' Association (EBA) and the former Raw Materials Inspectorate.

Particle separation takes place at different times when the granules are moved. In the case of fertilizers, this happens in two specific situations: during pouring, for example when filling a vehicle, and during spreading in the field using a centrifugal spreader.

Our research is focussed on the first of these situations initially. A heap forms naturally during pouring. Particles hitting the heap travel down the slope and come to a stop, some faster than others. Numerous experiments with different materials show that the biggest particles will tend to end up at the bottom of the heap. The same is true of fertilizer: the average particle size at the foot of the heap is greater than it is in the middle part of the cone. Automatic particle sorting by size therefore takes place during pouring. In the case of blends, if the particle sizes of the components are similar, chemical separation will not take place. If, on the other hand, all the large particles come from one ingredient and the fines from another, physical separation will be accompanied by chemical separation. Consequently, the blend formulation varies according to the location of the sampling site within the heap. The formulation applied by the farmer may therefore vary from one load supplied by the distributor to another. Likewise, when carrying out checks the likelihood of a negative analytical result is greater, depending on the sampling conditions.

To avoid this problem we propose establishing a limit of variability around the mean size of the blended particles, in order to control the separation process during pouring. These quality criteria are already offered for use by the EBA and are increasingly being used in connection with raw material purchasing by blenders. Mechanical means of preventing separation are also available as an additional remedy and can be used whenever possible.

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Potatoes: understanding the development of pectinolytic bacteria

Pectinolytic bacteria, such as Erwinia, cause many potato diseases, both in the field (blackleg and bacterial wilt) and in storage (soft rot). Prompted by the sizeable losses suffered by growers in 2001, CRA-W launched a research project to develop tools to deal with this problem. As no chemical treatment is available, the only way of controlling these pathogens is to take prophylactic measures to slow the development of the inoculum which is latent within lots to varying degrees depending on environmental conditions. It was found that the hot summer of 2003 had a very positive effect on the planted lots, with hardly any of the samples taken prior to harvest showing any signs of rot following an incubation test. A number of symptoms were noted in the field, on the other hand. Many of these were bacterial wilt due to *Erwinia chrysanthemi*, a species normally specific to milder climate areas.

We noticed a deterioration of the phytosanitary quality of the lots during storage. This may be accounted for by bacteria spreading among the tubers, probably due to the repeated handling during for example harvesting, sizing and sorting. The summer of 2004 was much wetter than the previous one. Strangely, we noted far fewer symptoms in the field, although it is usually thought that heavy wetting of the soil promotes bacterial development. While this was not confirmed in terms of symptoms in plants, we did note that the tuber samples taken from the field prior to harvest had a very high propensity to rot development. The rot was mostly due to the subspecies *Erwinia carotovora subsp. carotovora*.

When analysing samples taken from stored potatoes we noted a slight fall in the rot levels, in total contradiction to the observations in 2003. We attribute this to the positive effect of drying and cooling of the lots on entering the store. The information collected could usefully be used to enhance the effectiveness of the standard prophylactic measures recommended. We feel it is important to clarify the relationship between observation of symptoms in the field and the actual susceptibility of the lots to rot development in favourable conditions, with the aim of improving the management of the bacterial quality of potatoes grown on Walloon farms.

Project subsidised by the Regional Government of Wallonia, Department of Agriculture, Research Division under Agreement no. 2608/2.

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A Czech scientist working at the CRA-W on genetically modified potatoes

Kamila Zdenková, a research assistant at the Institute of Chemical Technology (ICT) of Prague in the Czech Republic, spent 9 months at the CRA-W sponsored by the Belgian Federal Science Policy under the cooperation programme with Eastern European countries. During her stay she devoted her time mainly to developing quantitative polymerase chain reaction (PCR) methods applicable to genetically modified (GM) potatoes. Recently, Monsanto has developed several GM potato lines with the new resistance traits to some insects and/or viruses. The work done during the stay, however, involved a plant model consisting of GM potato tubers derived from lines produced at the FUSAGx in the plant biology unit. The new trait in these potatoes is linked to the insertion of the *katE* gene from *Escherichia coli* that codes for catalase. Originally, the model was aimed at improving the understanding of some physiological aspects.

In order to develop a quantitative test with real-time PCR, two types of targets were needed. The first is the endogenous target that is specific to potato as a plant species; the second derives from the new DNA segment inserted into the potato genome. With regard to the endogenous target, several possibilities were tested. One of these genes appeared to be the best candidate because it is a unique gene (i.e., single copy) within the haploid potato genome (this was experimentally verified) and it is specific to potato. The specificity was successfully tested (i.e., no interfering signal) in DNA from tomato and eggplant, which belong to the same botanic family as potato. For the GM-screening reaction, the amplification of the cauliflower mosaic virus promoter region was chosen, and for the GM-construct-specific system a junction region was selected. Both systems were able to differentiate between the considered transgenic lines and the non-GM lines.

Some members of the molecular biology team with ir Kamila (right)

The quantitative test involved the use of plasmids for standard curves and therefore all the relevant targets had to be cloned. The PCR systems that were designed worked well and will be applied to test samples made out of defined mass fractions of GM and non-GM material.

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Ferti-Wal: organic crop fertilization software

In the wake of the various initiatives by the Regional Government of Wallonia to promote the development of sustainable agriculture and environmental management (programme for sustainable nitrogen management in agriculture (PGDA), agri-environmental measures (MAE), Natura 2000, etc.), the profitability and sustainability of farms with a high stocking rate are being directly threatened. In this context, animal production can no longer be maintained or developed without strictly observing the stocking ratios by having sufficient areas of land or effluent spreading contracts.

On the basis that farm manure production is all too often disregarded in fertilizing plans, with all the negative consequences that ensue (waste, pollution and nuisance), it is thus important to have tools available for providing personalised recommendations on the management of organic materials produced on the farm.

The complexity of the calculations required in order to draw up a fertilizing plan that takes account of various agri-environmental constraints prompted the development of some decision support software. This software, called Ferti-Wal, was created jointly by teams of scientists (CRA-W, ULB) and field teams (AgraOst, AWE) with the support of the Regional Government of Wallonia.

Ferti-Wal comprises a number of modules for data encoding, processing and extraction in report or map form.

The encoding module records all the analytical data that are directly observable on the farm, such as herd composition, description of the farm buildings (cowsheds, milking parlours, farm manure storage areas, etc.), a full description of the agricultural land (types of crop and yields) and a crop growing history (stubble management, organic and mineral fertilizer application, grassland management and so on). For each plot the user has the option of linking voluntary or compulsory agri-environmental constraints (PGDA, MAE, Natura 2000, etc.) or spatial constraints (proximity to housing, distance from the farmhouse, and so forth).

The second module uses the data recorded to determine the volume of farm manure produced by the livestock (in terms of quantity and quality) and the actual fertilizer needs of the crops and grassland, taking the selected constraints into account.

The extraction module produces a projected fertilizing plan in printable report form for farm manure spreading. This plan optimises the distribution of organic materials over the farm, taking into account the utilisation of fertilizers by the plants (spreading period, rotation sequence, plants' fertilizer requirements, etc.).

The report also provides details for each crop of any mineral supplementation necessary and highlights the potential savings that can be made (quantity and monetary value of the fertilizer) if the recommendations are followed.

Lastly, a Geographical Information System (GIS) linked to the software enables the projected fertilizing plan data to be spatialised in order to improve the legibility and interpretation of the advice.

Composting cattle dung

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Traceability – Food Safety in Small and Medium Enterprises (SME)

A practical training tool for quality in small-scale production has been developed as part of the EU SECUPROD project for use by small and medium enterprises in the food sector. The tool comprises a methodological module and a practical module covering wine making and cheese making (http://www.secuprod.com)

Details available from CRA-W

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International symposium on food and feed safety in the context of prion diseases

Les Presses agronomiques de Gembloux

V. Baeten, P. Vermeulen, G. Berben, P. Dardenne, 2005, 101 pages.

Compiled following the symposium held at Namur on 16, 17 and 18 June 2004 as part of the EU STRATFEED project, this is a compilation of 11 articles looking at the latest scientific progress in food and feed safety in the context of prion diseases. (http://stratfeed.cra.wallonie.be) Publication available from CRA-W

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Potato conference

Wednesday 23 November 2005

The aim of this half-day conference is to take an inventory of potato research at CRA-W. This is an opportunity for anyone working in the industry to see and listen to a variety of presentations, posters, stands and demonstrations.

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11th Carrefour des Productions animales

Milk …. A dynamic sector

Wednesday 25 January 2006

Cost: € 60, free to students; lunch € 25

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