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(a) Orchard testing of NECTEM™; a warning system for apple canker and *Nectria* fruit rot

In the last three years knowledge of the biology and epidemiology of *Nectria galligena* has greatly increased through research funded by MAFF. APRC funding has enabled these results to be implemented as an operational system giving warnings of infection periods leading to *Nectria* fruit rot and apple canker. The objective of this project was to evaluate NECTEM™ in the orchard and to examine ways of making practical use of the information generated.

In July 1994 Metos weather stations were set up in three Cox orchard sites in Kent with a history of both apple canker and *Nectria* fruit rot and with contrasting environmental conditions. The sites chosen were at Ash in East Kent, Rocks Farm, East Malling and Matfield. Weather data (temperature, rainfall, relative humidity, leaf wetness) were regularly monitored from July to early November at Ash and Matfield and from July onwards at East Malling. In September, 200 Cox apples were harvested from each orchard, selecting fruit adjacent to actively sporing *Nectria* cankers to ensure exposure to *Nectria* spores and the maximum chance of fruit infection. Harvested fruit are stored in a C.A. store at East Malling and will be assessed for *Nectria* rots in February/March 1995. In addition 200 Spartan fruits were similarly harvested from the orchards at Ash and East Malling in late September, and 200 Ida Red fruits from the orchard at Matfield. These fruits will be cold-stored until December/January and assessed for *Nectria* rots. The weather data collected from the three sites will be evaluated using NECTEM and the numbers of identified *Nectria* infection periods compared to the incidence of *Nectria* fruit rot in the harvested apple samples.

At Rocks Farm, East Malling the weather will continue to be monitored until December 1994. At weekly intervals from mid-November five pruning cuts to two-year old wood will be made, on each of ten trees of cv Cox, Spartan and Discovery in an orchard with a history of *Nectria* canker. In Spring 1995 the pruning cuts will be assessed for incidence of *Nectria* canker and this compared to the numbers of infection periods identified by NECTEM™ during this period.

particularly on apples, and in orchards suggest that some rots could result from infection at blossom time. The objective of this study was to investigate whether fungicide sprays applied during blossom resulted in control of subsequent rotting in store.

Two orchards were selected - one Conference pear and one Cox apple orchard - both with a history of *Botrytis* fruit rot. In these large replicated plots were established and fungicide treatments of either carbendazim (Bavistin) or carbendazim + captan (Bavistin + Captan) applied at first flower and again 7 days later and repeated at petal fall and 7 days later. Untreated plots were also included. Sprays were applied at medium volume of 500 litres per hectare using orchard air blast sprayers. Conditions during pear blossom were cool and the blossom period consequently prolonged such that all 4 sprays were applied. By contrast conditions during apple blossom were warm and the blossom period consequently shorter such that only 3 sprays were applied.

At early fruitlet stage in the pear trial, 30 aborted fruitlets and 30 set fruitlets were sampled at random from each plot. These were incubated under humid conditions in the laboratory and assessed for rotting. Least rotting occurred in the Bavistin + Captan treated fruitlets (48%). Rotting in the untreated and Bavistin treated fruitlets was similar (81-87%). Most of the rotting was due to *Alternaria* sp. Further observations in the plots post blossom did not detect any other sign of rotting or *Botrytis* infection on developing fruits. At harvest two bins of fruit were picked from each plot and one drenched with iprodione and the other undrenched.

The bins were placed in cold store. The effect of the treatments on rotting will be assessed at the end of the storage period in 1995.

In August in the apple trial 200 fruits were assessed in each plot for dry eye rot and calyx scorch. The incidence of dry eye rot was extremely low, but less calyx scorch was recorded in the Bavistin + Captan and Bavistin treated plots than in the untreated plots.

Unfortunately assessments of the effects of the treatments on subsequent rotting in store cannot be made as the trial was harvested without our knowledge. However samples of fruit from untreated plots were taken and stored and will be assessed for rotting. An overall assessment of rotting in fruit stored from the orchard will be made at the end of the storage period.

(b) Development of a system of storage rot risk assessment for Cox apples to determine the need for treatment or to evaluate storage potential in the absence of treatment

Preliminary studies on rot risk assessment funded by MAFF, based on fruit mineral analysis, previous rot history, pre-harvest orchard assessments and weather data have given promising results. Data for these various factors for 21-25 orchard sites have been collected for three seasons together with the number and identity of the rots that subsequently develop in samples of 500 apple fruits taken at harvest and stored in CA until March. The data for the three seasons has been collated and preliminary statistical analysis carried out by the Biometrics Unit at HRI East Malling. This will allow the relationship between the various factors and subsequent rotting to be determined, and a preliminary model developed.

In August 1994 assessments were made of various factors in 24 orchard sites in Kent. Twenty orchards were the same sites as previously, but four new sites were included to replace orchard sites that had been grubbed. At harvest 500 fruits were sampled at random from each orchard and will be stored in CA until next March for assessment of storage rots. Additional samples of 30 fruits were also collected at harvest for fruit mineral analysis. Many growers rely on fruitlet analysis from samples taken in July. Therefore in addition to the harvest fruit samples, each orchard was sampled in July for fruitlet analysis. These results will also be evaluated for inclusion in the system.

Pre-harvest orchard assessments and fruit analysis data were also collected from 3 other Cox orchard sites. The preliminary model produced from the statistical analysis of three years data for 21-25 orchard sites will be used to predict rotting for these three orchard sites. At harvest drenched and undrenched bins of fruit were placed in CA store. The resultant rotting will be compared with that predicted.

Collaborative work is also underway with FAST and Professor Swinburne at Wye College to evaluate the potential of ELISA testing of fruit samples at harvest as a means of predicting rotting in store. Further fruit samples were picked at random from each of the 24 orchards and supplied to FAST and to Professor Swinburne. ELISA tests will be conducted on these samples for *Botrytis cinerea* and *Nectria galligena* using antisera provided by Dr. Molly Dewey (Oxford University). The results obtained on rot incidence will be compared with the level of rotting in the samples of 500 fruits stored in CA when assessed in 1995 at the end of the storage period.

(c) The effects of fungicide sprays at blossom time on *Botrytis rot* of stored pears and apples

The recent surveys of rotting in drenched and undrenched apples cv. Cox and pears cv. Conference identified *Botrytis cinerea* as causing significant losses in store in both Cox and Conference. Observations on the damage in store,