Site specific assessment of spray drift hazard for avocados in New Zealand

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New Zealand

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Outline

- Orchardists share the landscape with non-productive lifestyle properties
- Risk of spray drift and tension is inevitable
- Tools are required to improve management in this area
- CART is a software tool designed for this purpose

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CART
"Cumulative Agrichemical Residue Tracking"

A web-based GIS system

- to assess potential hazard from spray drift

- For orchard spray operation planning and recording

- Piloted on Avocado orchards

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- **Integrating**
  - **Spray Drift models and chemical dissipation**
  - **With defined Hazard levels for neighbouring land uses and sensitive areas**
- **To**
  - **Allow users to manage spray drift hazard at the time of spraying**
  - **Demonstrate good agricultural practice (Market Access)**
  - **Facilitate regulatory compliance with legislation**

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Key Aspects

- Set in a Web based - GIS environment
- Farm manager/Sprayer are key users
- Crop interception and sprayer targeting are estimated
- Wind speed and direction entered manually
- AgDisp is used to predict droplet deposits downwind
- Deposit curve is modified using Raupach et al's model of droplet capture by shelterbelts.
- Deposit levels are compared with agrichemical specific predetermined hazard threshold levels to give green or red light for spraying.

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CART input and output screens

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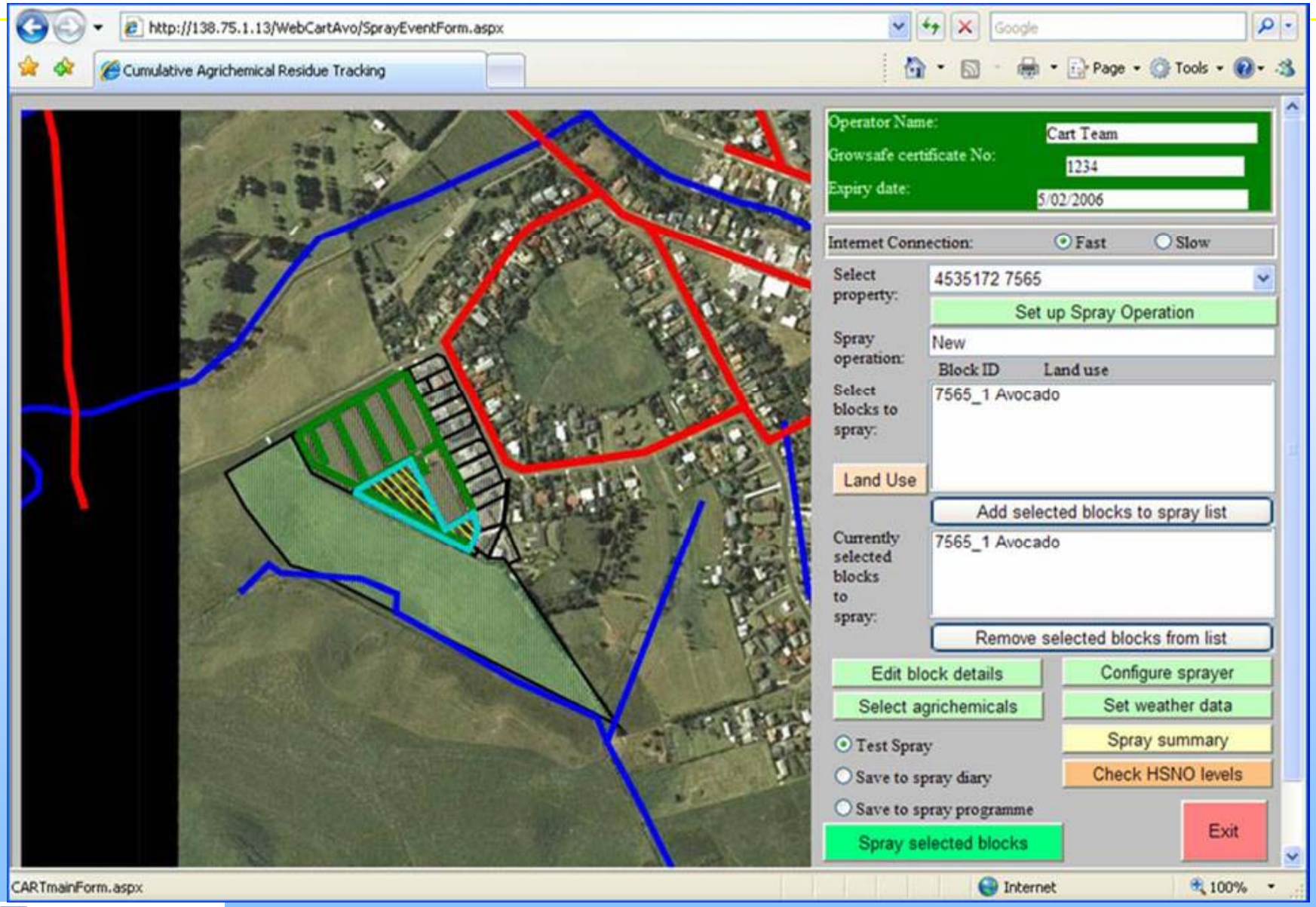
CART is accessed via a web interface



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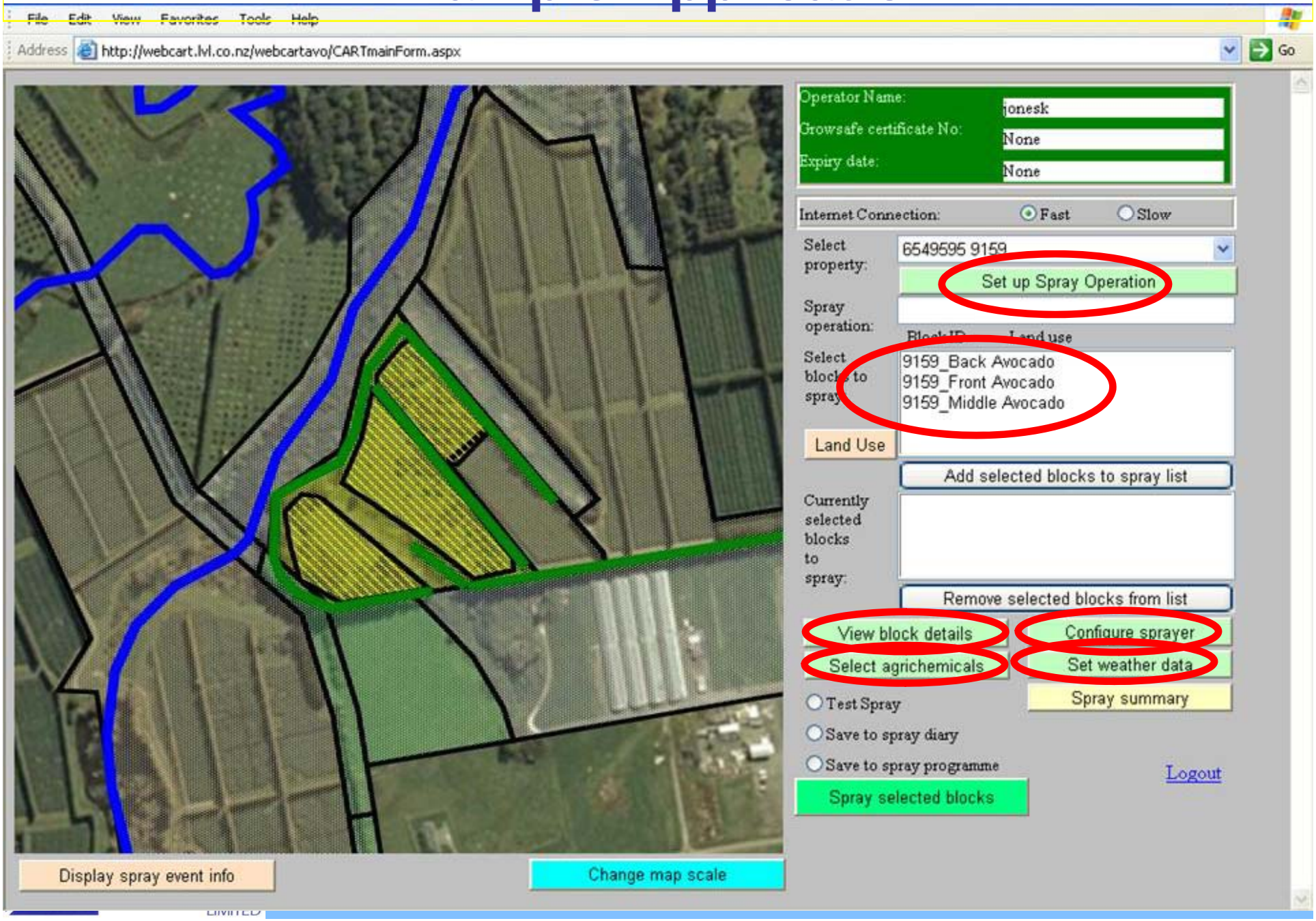
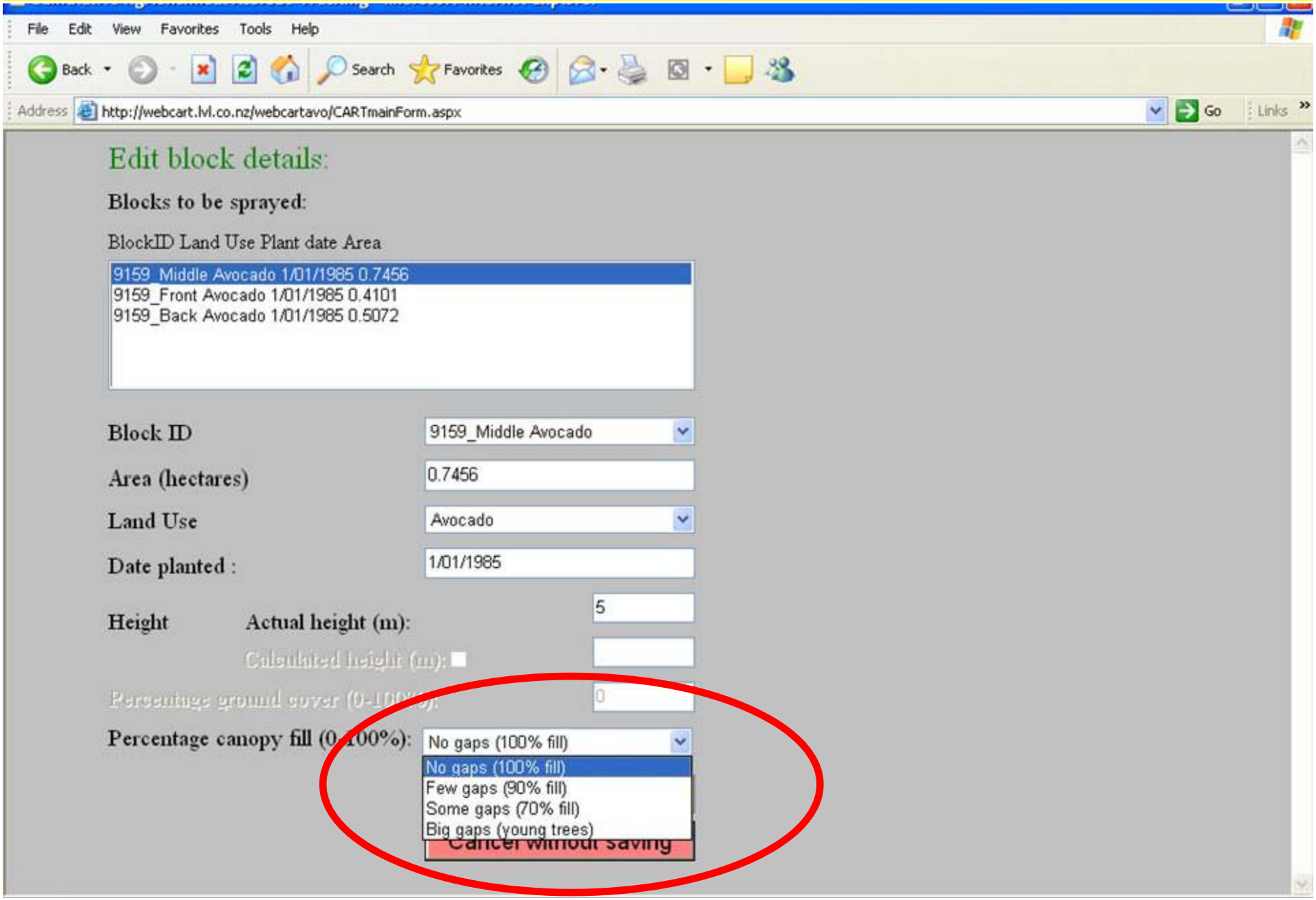
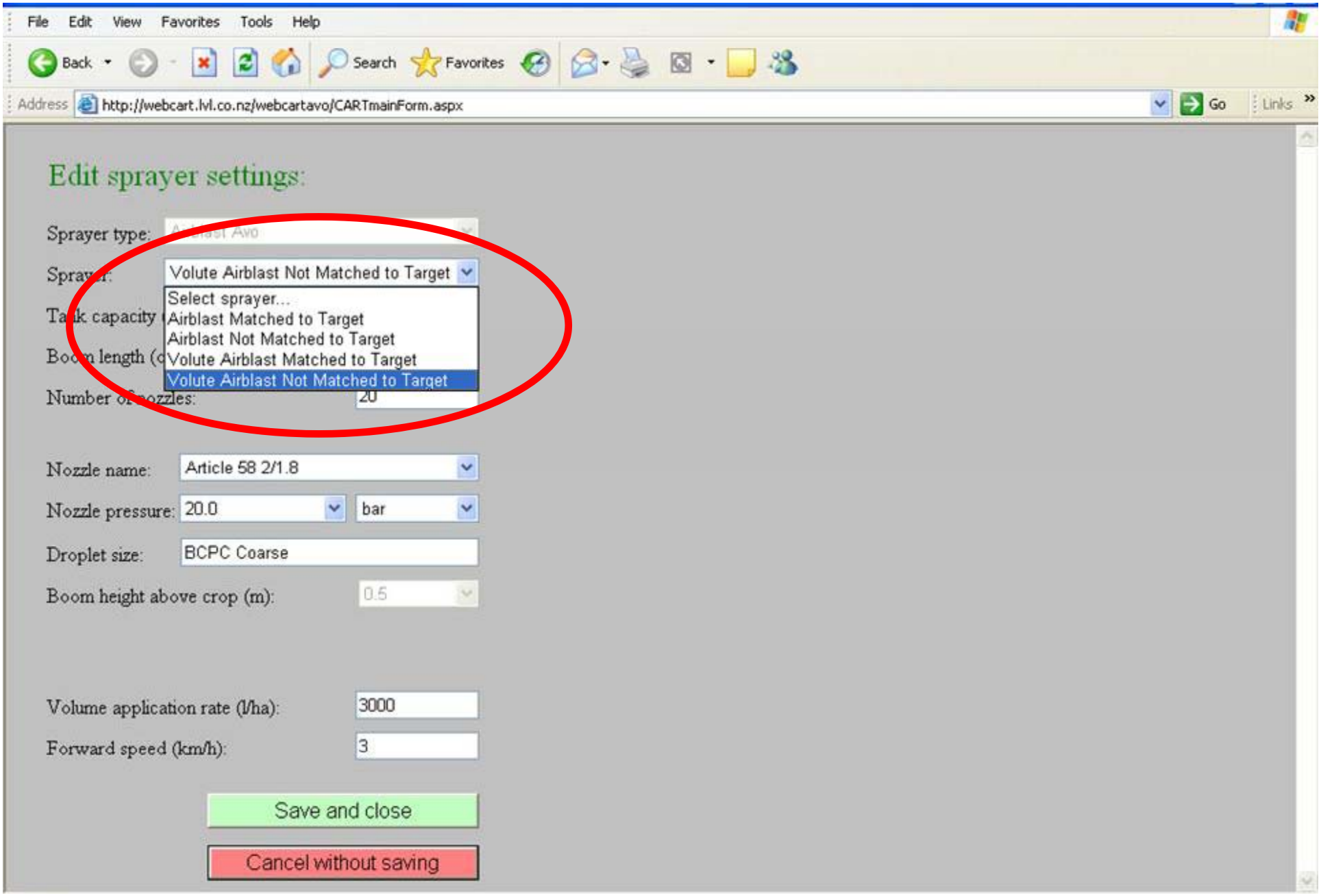
Example Application



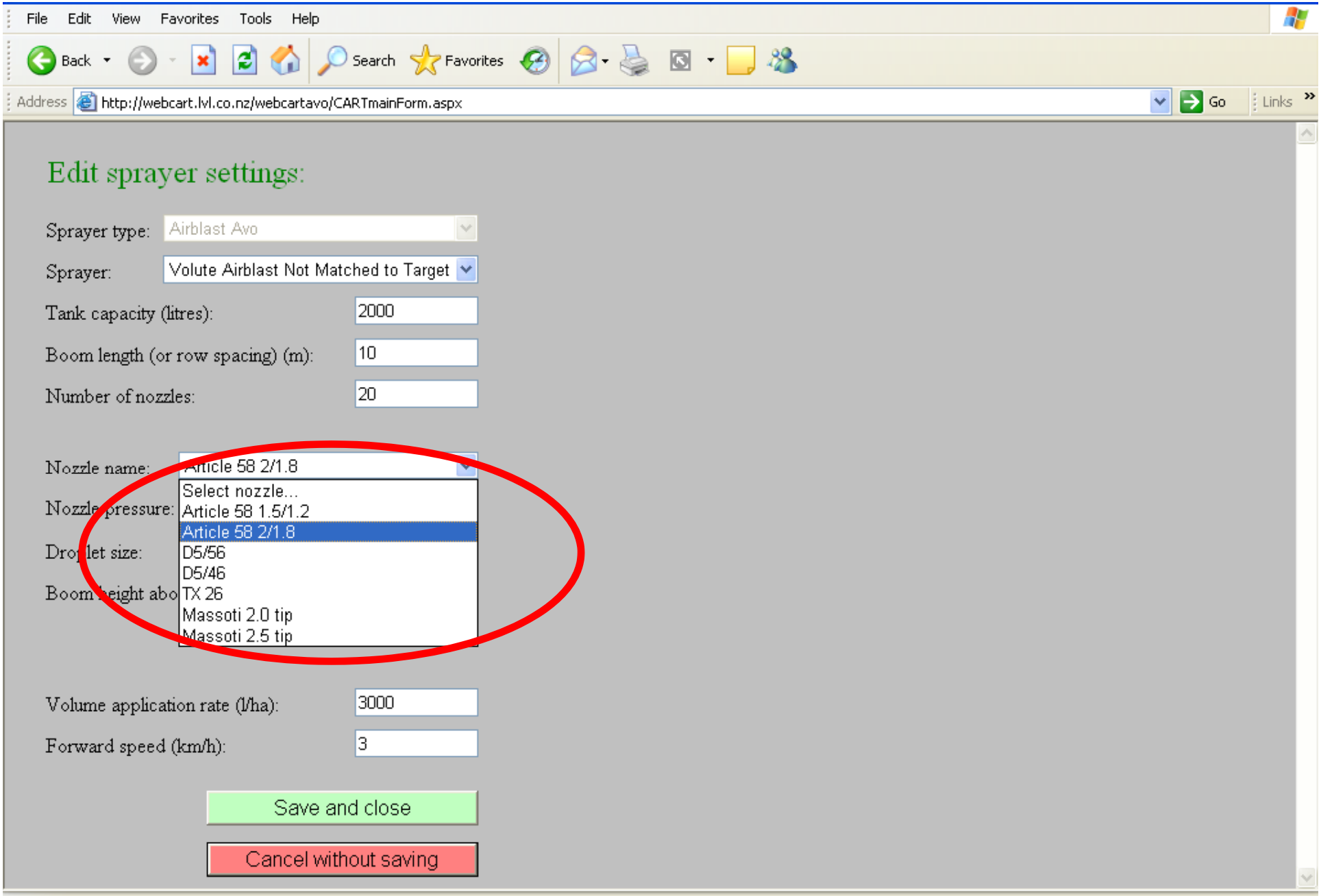
User enters target crop parameters



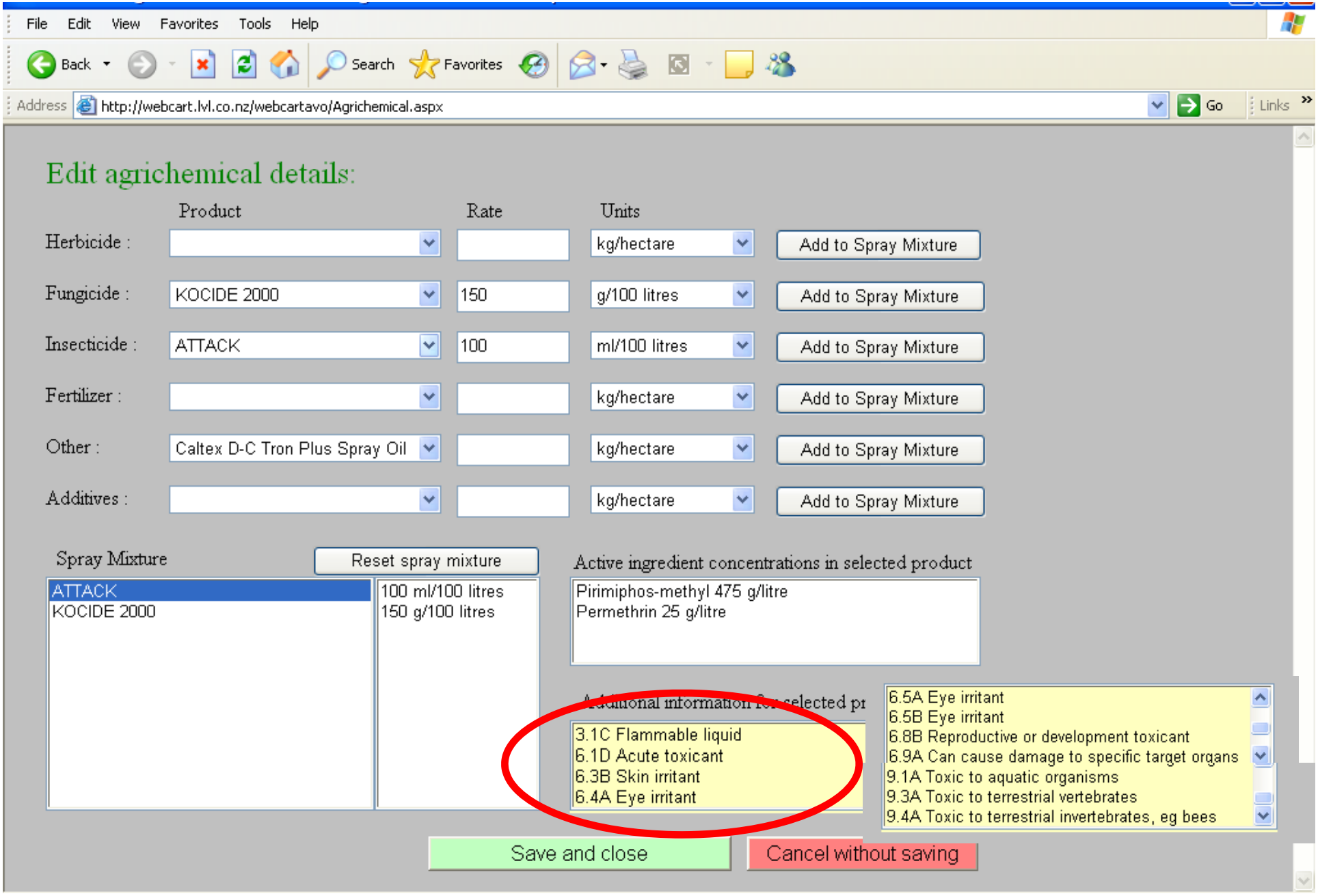
User describes sprayer technology used



User describes sprayer technology used



User enters details of tank mix



User enters wind and other weather data

File Edit View Favorites Tools Help

Back Search Favorites

Address http://webcart.lvl.co.nz/webcartavo/CARTmainForm.aspx Go Links

Edit weather details:

Manual Input Use forecast Current from weather station

Select direction wind is coming from by entering value in degrees or clicking on point of compass rose:

North

West East

South

112.5

Wind speed (at 2m height): 1 m/s km/h

Temperature (degrees C) : 20

Relative Humidity (%) : 70

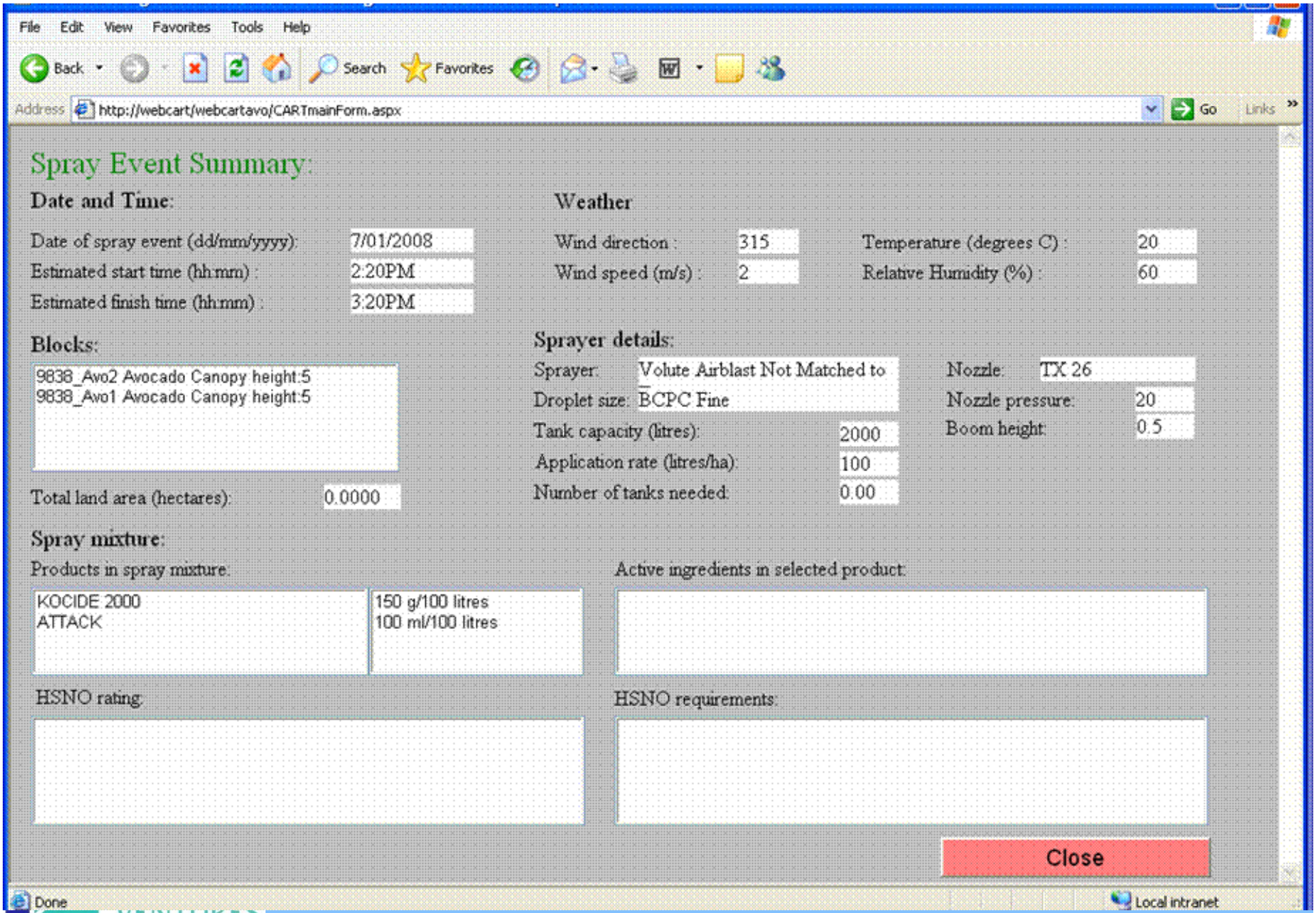
Date of spray event (dd/mm/yyyy): 8/07/2007

Estimated start time (hh:mm) : 9:16 am pm

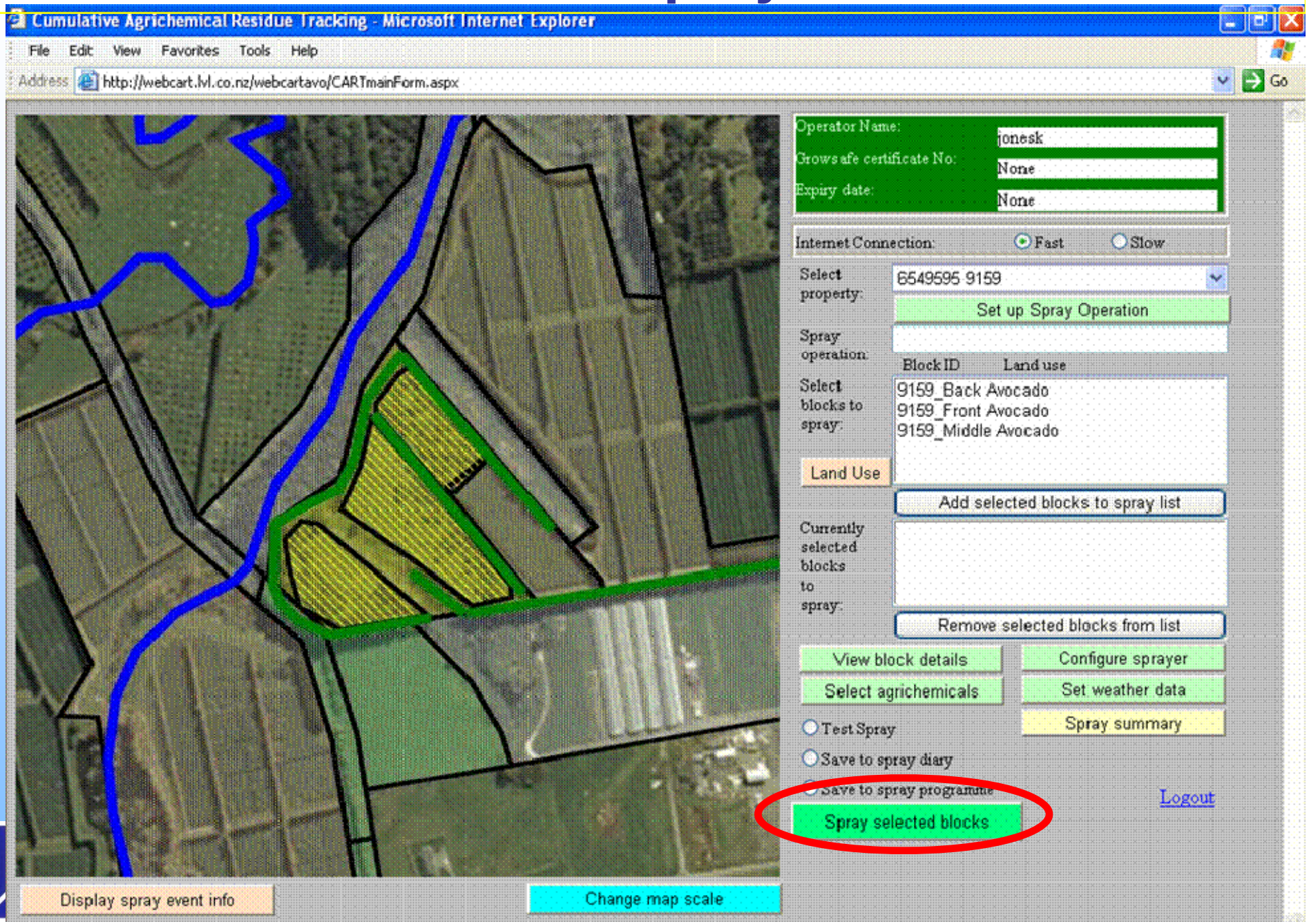
Estimated finish time (hh:mm) : 10:16 am pm

Save and close

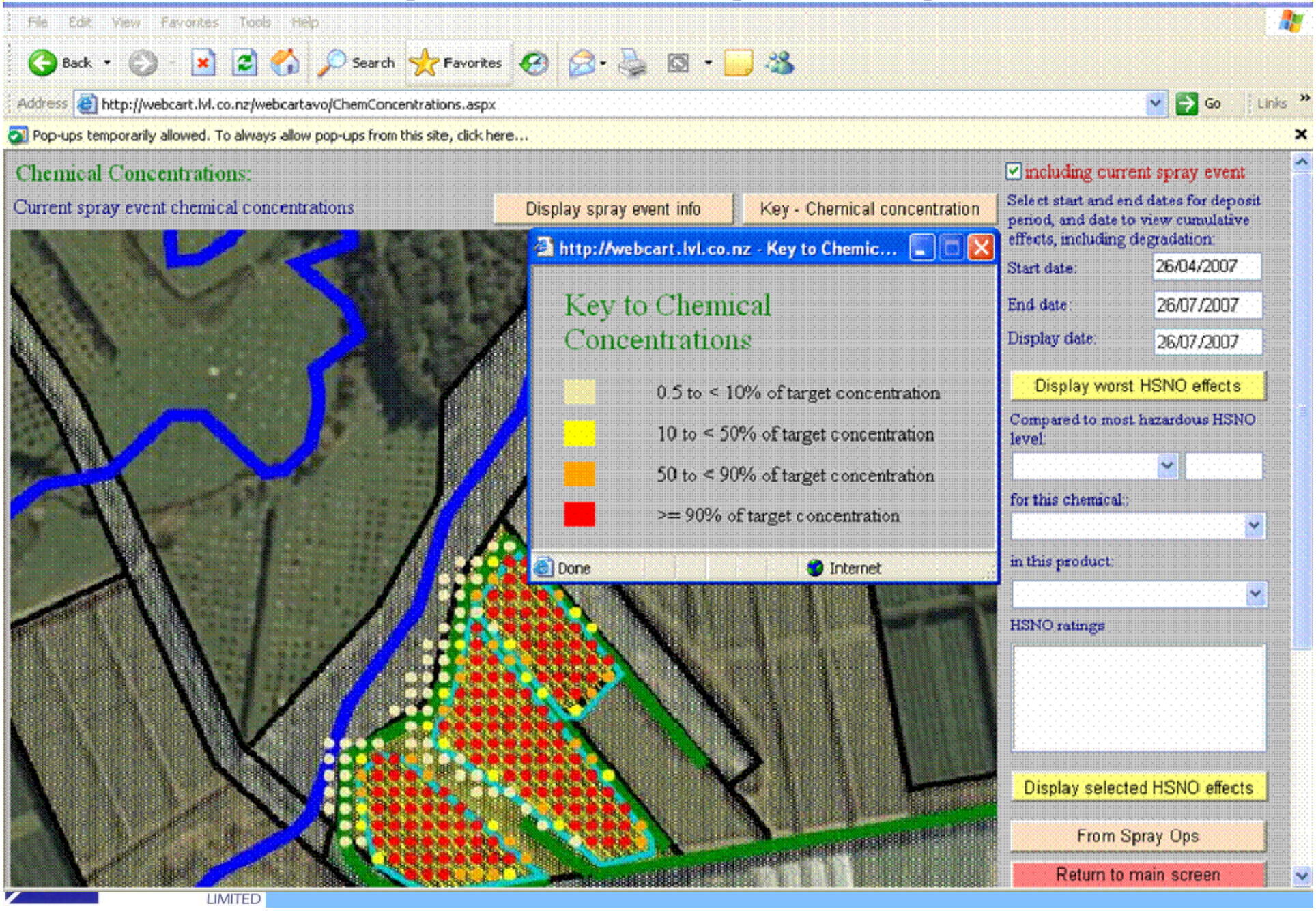
Cancel without saving


File Edit View Favorites Tools Help
Back Search Favorites
Address http://webcart/webcartavo/CARTmainForm.aspx
Go Links
Spray Event Summary:
Date and Time:
Date of spray event (dd/mm/yyyy): 7/01/2008
Estimated start time (hh:mm) : 2:20PM
Estimated finish time (hh:mm) : 3:20PM
Weather
Wind direction : 315
Wind speed (m/s) : 2
Temperature (degrees C) : 20
Relative Humidity (%) : 60
Blocks:
9838_Avo2 Avocado Canopy height:5
9838_Avo1 Avocado Canopy height:5
Total land area (hectares): 0.0000
Sprayer details:
Sprayer: Volute Airblast Not Matched to
Droplet size: BCPC Fine
Tank capacity (litres): 2000
Application rate (litres/ha): 100
Number of tanks needed: 0.00
Nozzle: TX 26
Nozzle pressure: 20
Boom height: 0.5
Spray mixture:
Products in spray mixture:
KOCIDE 2000
ATTACK
150 g/100 litres
100 ml/100 litres
Active ingredients in selected product:
HSNO rating:
HSNO requirements:
Close
Done
Local intranet

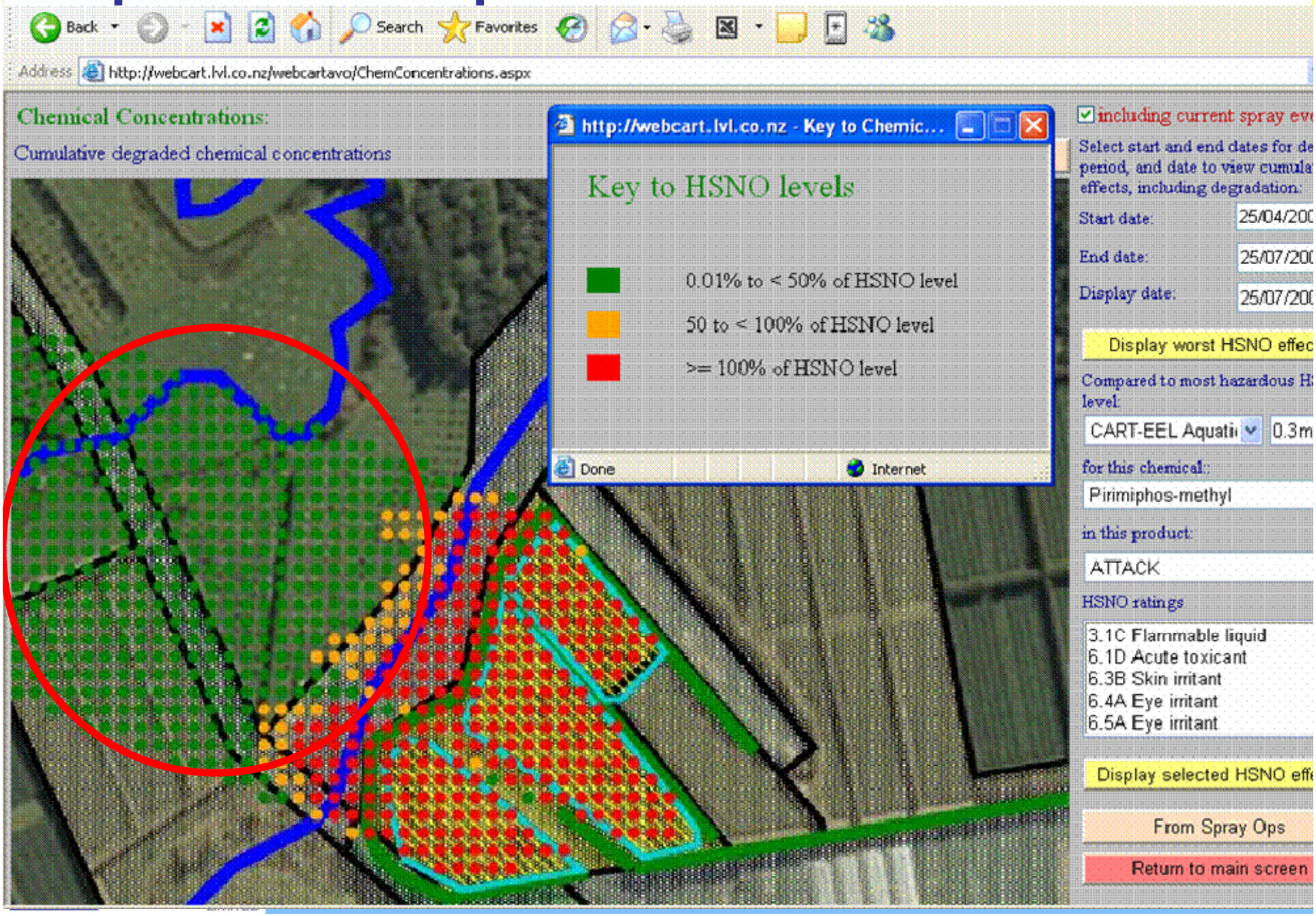
User can now select “Spray selected blocks”



CART predicts map of deposits



Deposition compared with hazard thresholds



CART Regional Spray Deposition Mapping

- Spray diaries from 3 orchards for 20th April 2005 to 31 December 2005.
- Weather data for the orchards used the closest local weather station records from internet
- The sprayer configuration was estimated
- Each spray event was set to an hour long duration.

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CART Spray Deposition Mapping

- The results from the Spray events were put in an Access database linked to a GIS system.
- A query form built in the GIS to choose date and chemical
- Query produced a spatial image showing deposition levels
- Example for Copper Hydroxide

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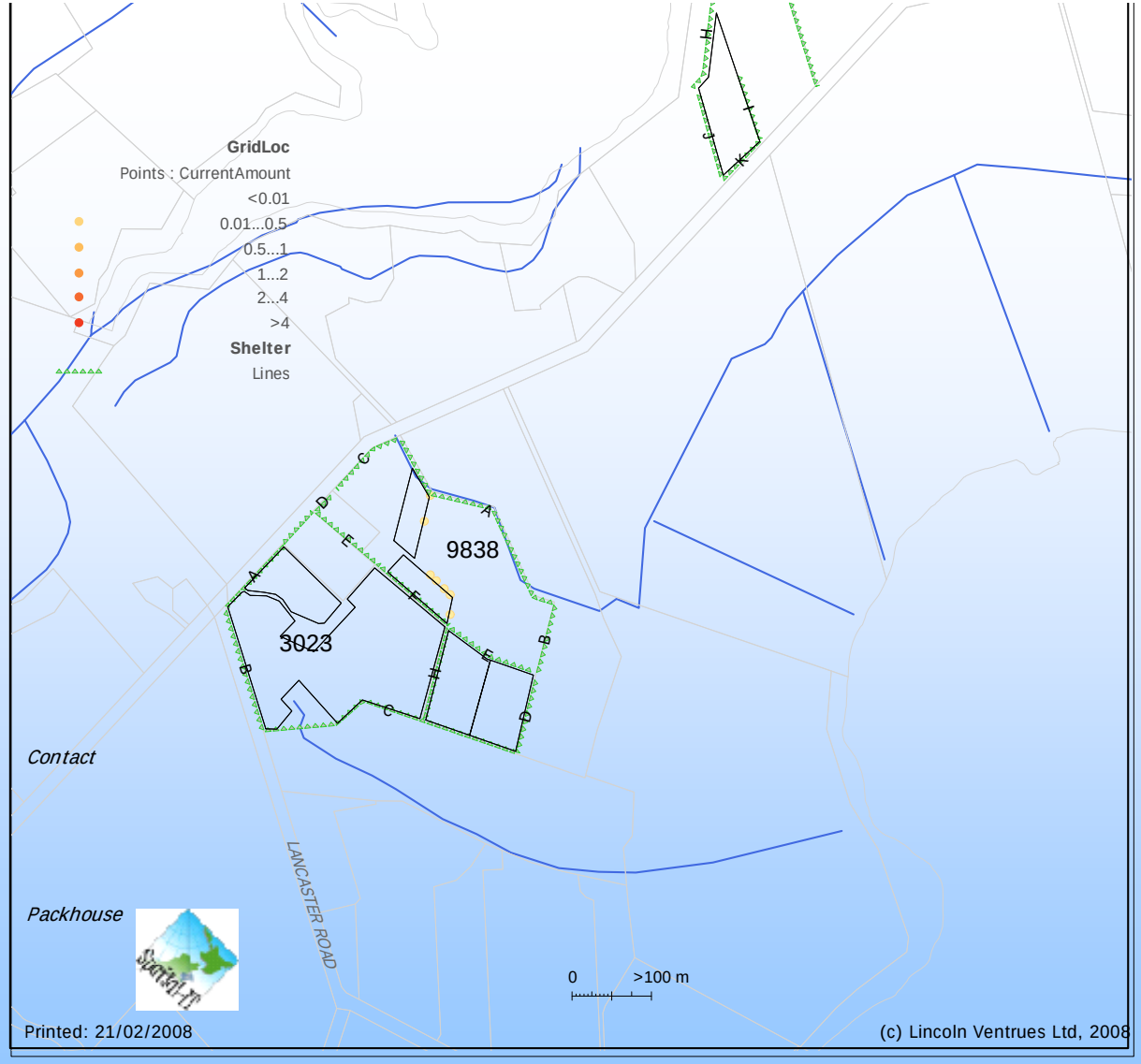

2 & 3 August 2005, orchard 3023 was sprayed with 150 g/100L Kocide DF (2000 DS)

4 & 5 August 2005, orchard 9838 sprayed 150 g/100L Kocide DF (2000 DS).

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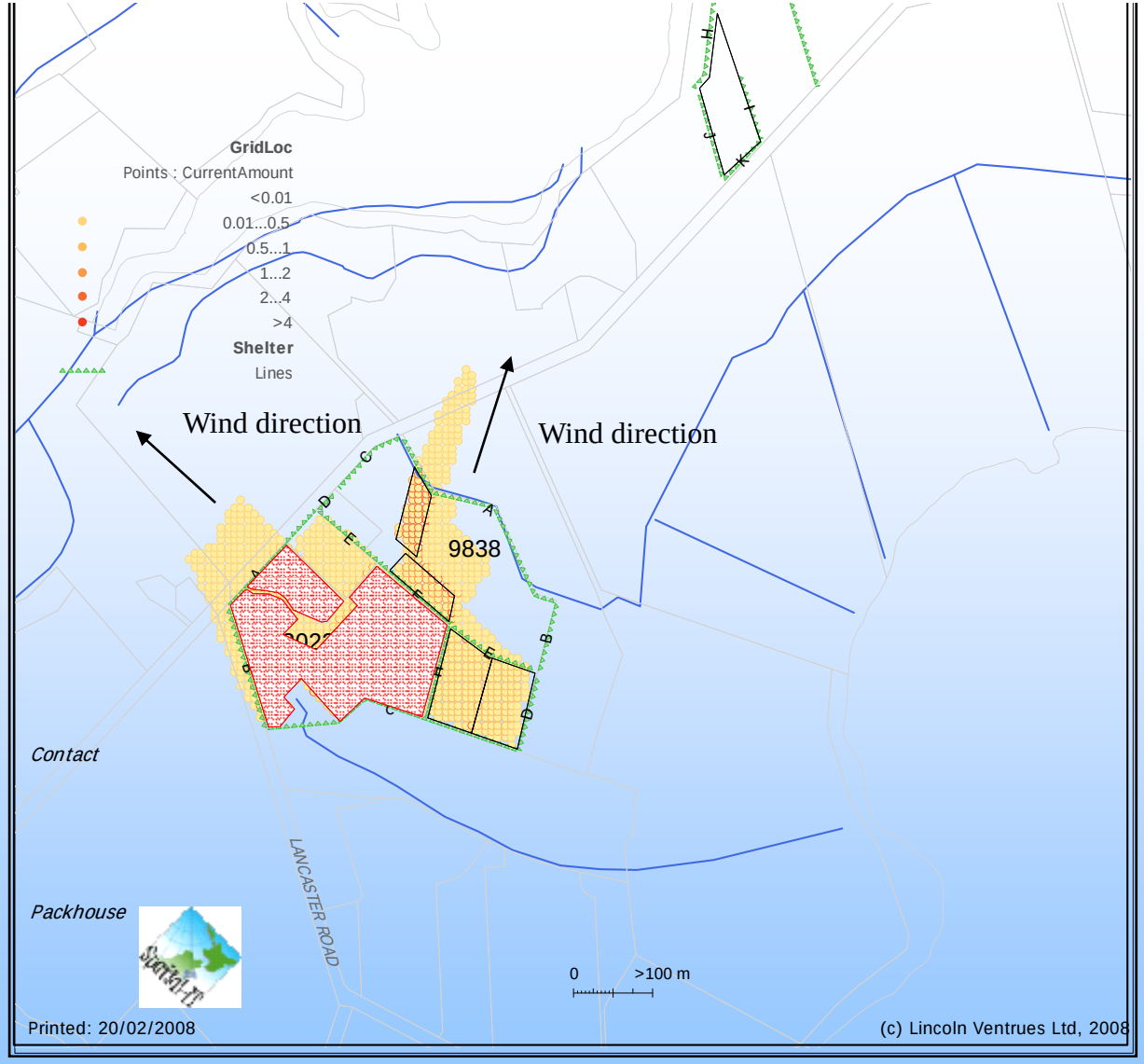
20427-59-2
Copper hydroxide



8 August 2005, two days after all spraying completed on orchards 3023 and 9838 with Kocide DF (2000 DS)

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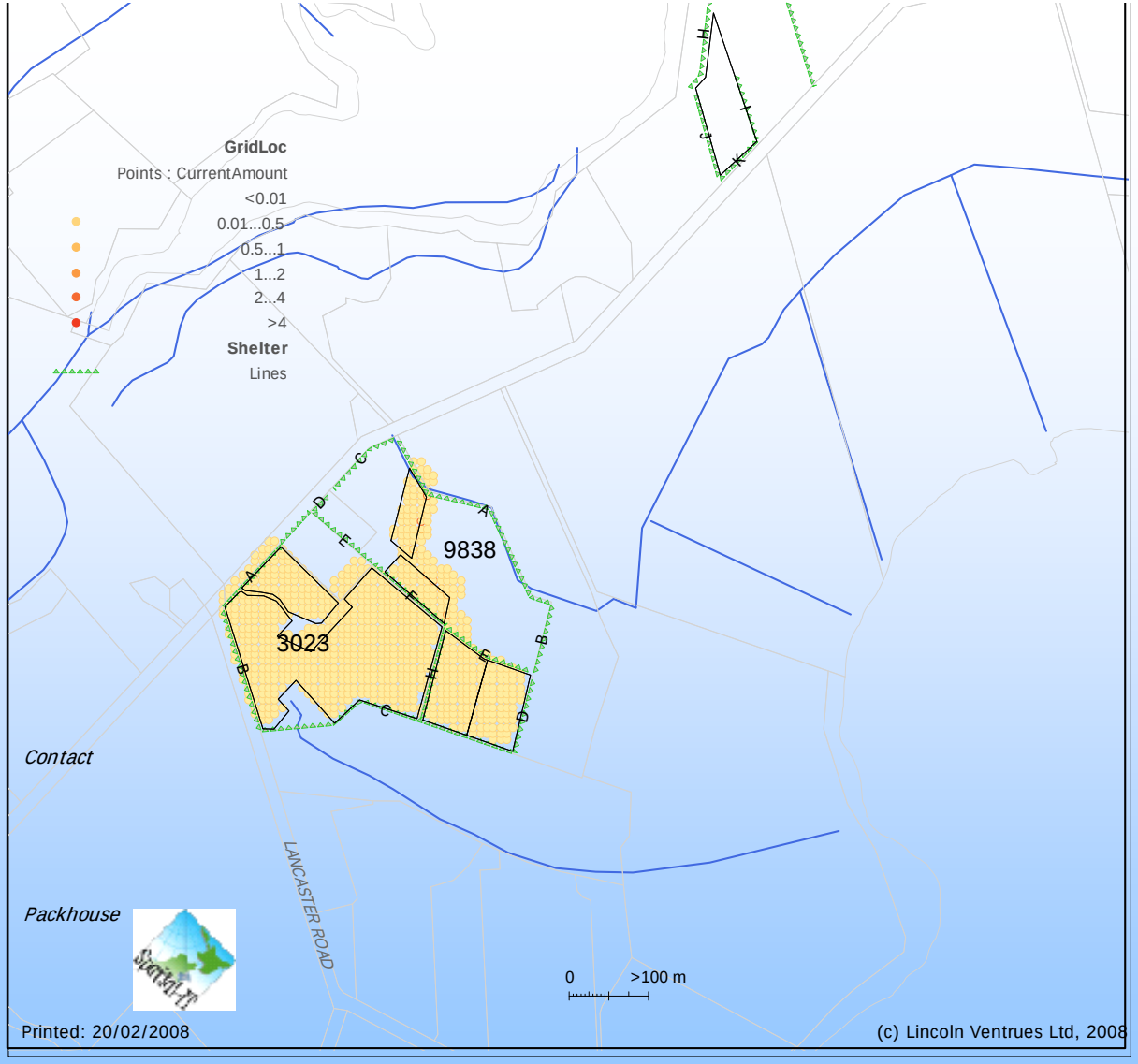
20427-59-2
Copper hydroxide



28 August 2005, about 20 days after the last lot of orchard spray events of Kocide DF (2000 DS)

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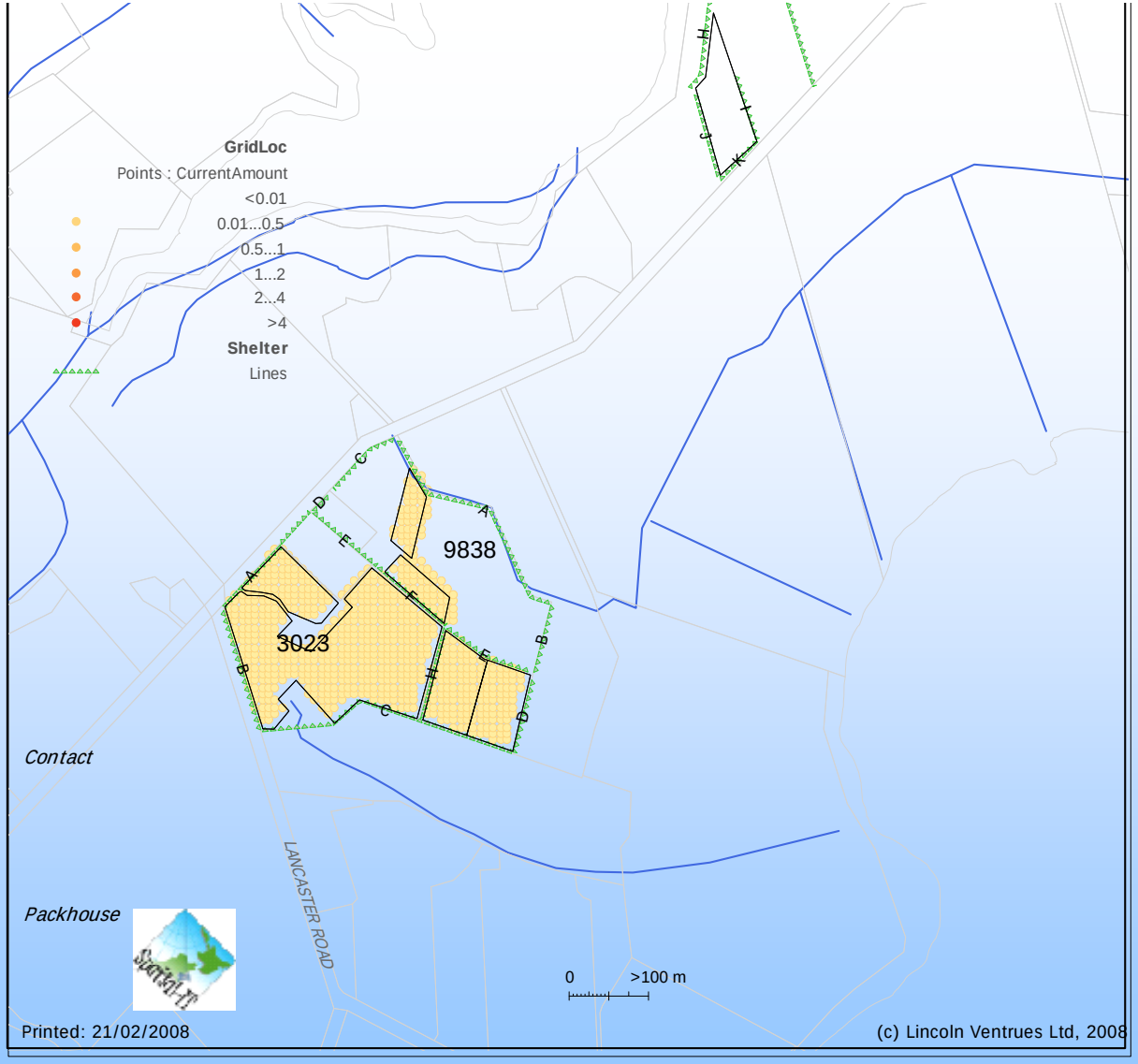
20427-59-2
Copper hydroxide



14 September 2005, about 35 days after the last lot of orchard spray events of Kocide DF (2000 DS)

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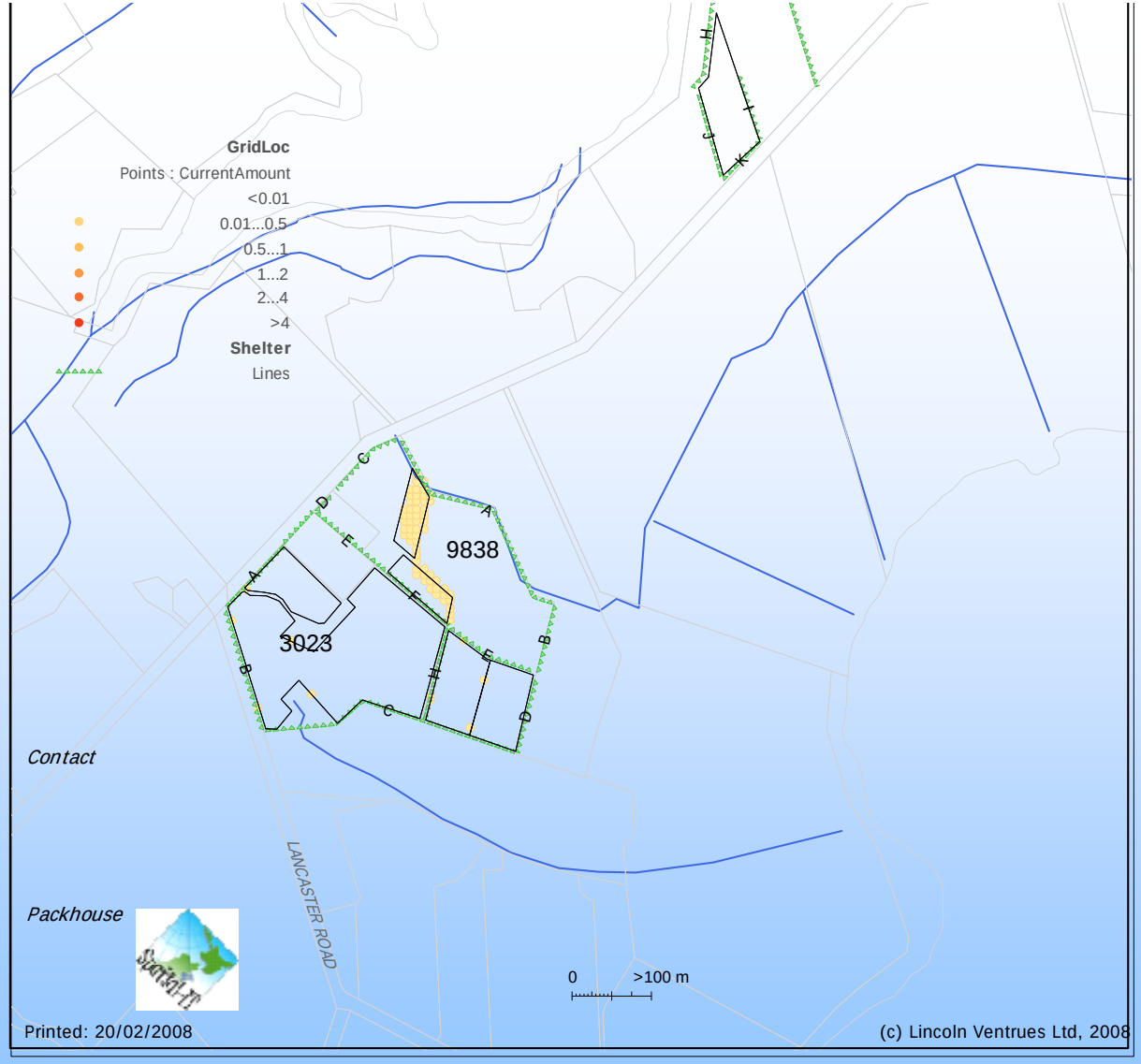
20427-59-2
Copper hydroxide



28 September 2005, about 50 days after the last lot of orchard spray events of Kocide DF (2000 DS)

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Summary

- CART is a planning and recording tool
- Pilot project with avocado growers
- Integrates relevant site specific data and predictive models
- Compared predictions with regulatory levels for hazardous substances
- Provides better relevance than prescribed buffer zones

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Foundation for Research Science and Technology (NZ)
Avocado Industry Council (NZ)

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GIS-based tool for regional analysis currently under development