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# FIRST RESULTS FROM ETHANEDINITRILE ($C_2N_2$) FIELD TRIALS IN AUSTRALIA

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## *Trial 1: Control of Pythium in carrots (Medina, Western Australia)*

The first, small-scale, field trial of ethanedinitrile ($C_2N_2$) was conducted by CSIRO researchers in Western Australia to test control of *Pythium sulcatum*, the cause of cavity spot disease in carrots. The soil was coarse, porous sand and no plastic sheet covering was used (Table 1). We used this first field trial to develop an application method with slight modification to existing equipment used for the application of methyl bromide or Telone, and to calibrate the flow rate. There were difficulties in regulating the flow of gas into the soil in the small (10 m long) plots, and the application doses were therefore quite variable. Nevertheless, the incidence of *Pythium* infection in the seedlings was reduced by 79%, the incidence of forked or stumped carrots at harvest was reduced by 54% and the marketable carrots at harvest were increased by 55% (Figure 1).

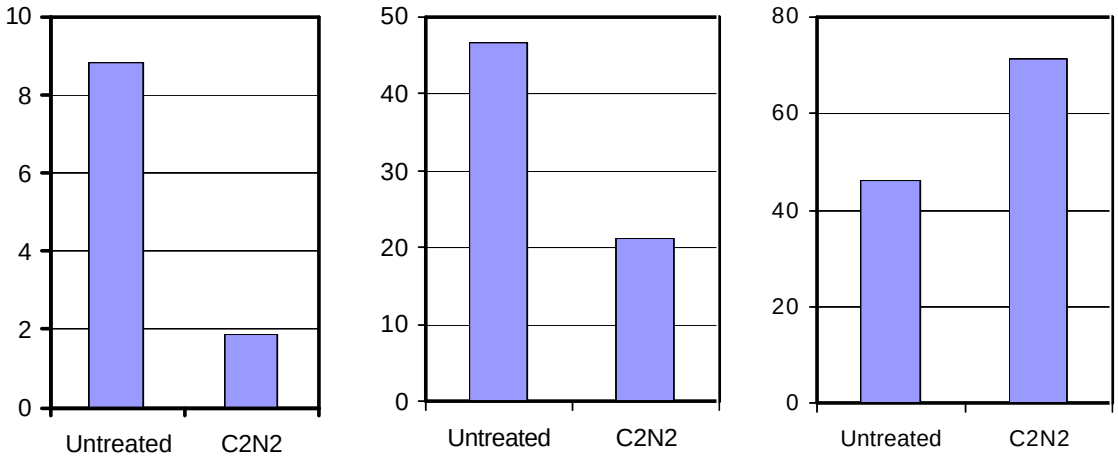
- Measurements of the concentration of $C_2N_2$ and HCN in the soil showed that:
  a. $C_2N_2$ declined very quickly: within 2 hours > 95% of $C_2N_2$ disappeared
  b. < 2% of $C_2N_2$ was converted to HCN
  c. Both $C_2N_2$ and HCN declined to background levels 2 days after application
- Measurements of the environmental levels of $C_2N_2$ during the fumigation were much lower than the TLV of 10 ppm.
- Measurements of $C_2N_2$ and its converted residues in carrots and leaves showed that fumigation with $C_2N_2$ has not introduced $C_2N_2$, HCN, $NH_4OH$ or $NO_3$ residues.

## *Trial 2: Control of wintergrasses and pathogens in strawberry runner beds (Toolangi, Victoria Australia)*

A recent commercial scale field trial to control pathogens and winter growing grasses in strawberry runner beds was conducted in Toolangi, Victoria (Table 1). All three test pathogens (*Phytophthora cactorum, Sclerotium rolfsii, Rhizoctonia fragariae*), as well as the vegetative growth present (wintergrasses) were completely controlled in the 25 and 50 g/m$^2$ plastic covered plots (Table 2). Rapid degradation of ethanedinitrile was also confirmed as these plots were replanted and proved safe to the replanted crop.

Table 1. Details of carrot and strawberry runner field trials

| Site | | Medina, WA | Toolangi, VIC |
|---|---|---|---|
| Date | | 14 Feb. 2003 | 30 May 2003 |
| Soil type | | Sand | Heavy loam |
| | | Carrot field | Strawberry runner field |
| | | (32º13' S, 115º49' E) | (37º32' S, 145º28' E) |
| Moisture | | Irrigated | Rained |
| Temperature: | Surface | 17-60°C | 12.5-26.4°C |
| | Soil (10 cm) | 20-40°C | 15.3-17.7°C |
| RH (Soil) | | 50-100% | 65-100% |
| Dosage: | $C_2N_2$ (g/m$^2$) | 4-20 g/m$^2$ uncovered | 50 g/m$^2$, covered & uncovered |
| | | | 25 g/m$^2$, uncovered |
| | Telone C-35 | | 50 g/m$^2$ , covered |
| | Methyl bromide : chloropicrin (70:30) | | 50 g/m$^2$ , covered |
| | Methyl iodide: chloropicrin (30:70) | | 50 g/m$^2$ , covered |
| | | | 25 g/m$^2$, covered |
| Plot size | | 10m × 1m (14 plots) | 35m × 2.7m (18 plots) |
| Target organisms | | *Pythium sulcatum* | Wintergrasses, *Phytophthora cactorum, Sclerotium rolfsii, Rhizoctonia fragariae* |




Infection (%) of seedling roots 3 weeks post-plant

Forked/stumped (%) carrots at harvest

Marketable (%) carrots at harvest

Figure 1. Effect of *Pythium sulcatum* on seedling infection, forked/stumped and marketable carrots

Table 2. Weed assessments Toolangi, Vic trial, 2 months post fumigation.

| | Rate | | Total Weeds | | Monocots | | Dicots | |
|---|---|---|---|---|---|---|---|---|
| Treatment | (g/sq m) | Covered | Mean No.* | % of controls | Mean No.* | % of controls | Mean No.* | % of controls |
| C2N2 | 25 | no | 969.2 | 153.2 | 806.2 | 238.2 | 163.0 | 55.4 |
| C2N2 | 50 | yes | 7.8 | 1.0 | 6.8 | 1.1 | 1.0 | 0.7 |
| C2N2 | 50 | no | 693.1 | 109.5 | 602.4 | 178.0 | 90.7 | 30.8 |
| Methyl Bromide | 50 | yes | 3.1 | 0.4 | 0.0 | 0.0 | 3.1 | 0.8 |
| Methyl Iodide | 50 | yes | 2.5 | 0.4 | 1.6 | 0.4 | 0.9 | 0.6 |
| Methyl Iodide | 25 | yes | 100.0 | 43.1 | 97.9 | 73.0 | 2.1 | 0.5 |
| Telone C35 | 50 | yes | 168.8 | 72.4 | 147.9 | 112.1 | 20.8 | 15.2 |
| Untreated | 0 | | 632.8 | | 338.5 | | 294.3 | |

* No. per quadrat (0.4 x 0.4 m), mean of 4 counts