1983

# Chemical efficacy trials

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# SUMMARY OF EXPERIMENTAL RESULTS

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EXPERIMENTAL SUMMARIES 1983

Please find attached summaries for the following six chemical efficacy trials:-

83PE51 - Control of powdery scab of potatoes
83MD7 - Control of early blight of tomatoes
83MD11 - Control of sclerotinia in lettuce
83MD12 - Control of secondary black rot in cabbage
83MD13 - Control of tuber-borne Rhizoctonia solari of potatoes
83MD14 - Control of downy mildew of onions

The following trial has not yet been harvested:-

83MD15 - Chemical control of onion smudge.

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## CHEMICAL CONTROL OF POWDERY SCAB OF POTATOES - 83PE51

### Introduction:

A previous trial in 1982 had shown that mancozeb could be used as an alternative to difolatan for treatment of light soil types to control powdery scab. As tuber initiation is the critical period for infection with powdery scab, this trial aimed to assess the effect of timing of application on chemical efficacy.

### Materials and Methods:

A light soil type on a grower's property at Jandakot with a history of powdery scab problems was used as the trial site. Treatments were as follows:

1. Mancozeb 20kg/ha ) Preplant drench, incorporated into the soil.
2. Mancozeb 50kg/ha )
3. Difolatan 40kg/ha)
4. Untreated
5. Mancozeb 20kg/ha ) Applied as a drench at tuber initiation.
6. Mancozeb 50kg/ha )
7. Difolatan 40kg/ha)
8. Untreated

Potatoes were grown as a commercial crop. The centre rows of each treatment were harvested (5m long harvest row) and graded for scab as follows:

< 70g tubers
70 - 450g tubers < 5% scab - Grade 1
" " " > 5% scab - Rejects

Thus giving gross and marketable weights.

### Results and Discussion:

Analysis of variance detected no significant differences between timing of fungicide application. Significant differences were detected between fungicide treatments (5% level of significance) in percentage of Grade 1 saleable tubers harvested (see Table 1).

Table 1 - Percentage of Saleable Tubers

| Treatment | % Saleable Tubers ie. Grade 1 / Total Yield |
|---|---|
| 1. Mancozeb 20 kg/ha | 66.9 |
| 2. Mancozeb 50 kg/ha | 65.5 |
| 3. Difolatan 40 kg/ha | 55.2 |
| 4. Untreated | 51.3 |
| L.S.D. (5%) | 12.50 |

Yields from the mancozeb treatments were both significantly higher than the control, however they were not significantly different from the difolatan treatment. This confirms the 1982 results and as the lower rate of mancozeb proved effective this will be recommended in any registration application.

CONTROL OF EARLY BLIGHT OF TOMATOES - 83MD7

Introduction:

Early blight (caused by Alternaria solani) continues to be a major limiting factor in production of autumn grown tomatoes in the metro area. The bacterial speck disorder (caused by Pseudomonas syringae pv tomato) is often also present. This trial aimed to test the efficacy of available chemicals for control of early blight and to observe any effects of chemicals on the incidence of bacterial speck.

Materials and Methods:

Floradade tomatoes (determinate variety) were transplanted in the field in mid February to commercial specifications. Spraying commenced in late April, at the first signs of disease and continued at 7 day intervals; 6 sprays were applied per treatment. There were seven treatments and four replications.

Treatments were:

| | | |
|---|---|---|
| 1. | Bravo | 150g/L |
| 2. | Difolatan | 3.1 L/ha |
| 3. | Copper oxychloride | 200g/L |
| 4. | Kocide | 200g/L |
| 5. | Mancozeb | 150g/L |
| 6. | Antracol | 200g/L |
| 7. | Untreated | |

Plants were scored for foliage damage just prior to harvest by rating the third mature branch from the top of the mainstem for incidence and severity of early blight. Plants were picked progressively and totals of gross and marketable weights were noted.

Results and Discussion:

No significant differences were detected between treatments in gross or market weights of tomatoes. The trial showed no useful results re chemical efficacy. This is largely the result of an early and severe infestation of the crop with tomato spotted wilt virus, prior to the development of early blight and bacterial speck.

# CONTROL OF SCLEROTINIA IN LETTUCE - 83MD11

## Introduction:

A fungicide trial at Medina V.R.S. in 1982 showed that Benlate was the most effective of the chemicals available for control of sclerotinia (drop) of lettuce (caused by *S. sclerotiorum*). Ronilan and Rovral gave some yield increase but were not as effective as Benlate. However, the use of multiple sprays of Benlate at 7 day intervals in an intense cropping situation provides ideal conditions for the development of chemical resistance. This trial tested the efficacy of Benlate, Ronilan and Rovral combinations in a spray schedule to provide a practical spray program for control of lettuce drop.

## Materials and Methods:

A site severely infested with *S sclerotiorum* at Medina V.R.S. was planted with lettuce (cv Black Velvet) to commercial specifications and the following spray treatments were applied at 7 or 14 day intervals from thinning:

| | | |
|---|---|---|
| 1. | Untreated | |
| 2. | Benlate | at 7 day intervals |
| 3. | Benlate | at 14 day intervals |
| 4. | Benlate/Rovral alternate sprays | at 7 day intervals |
| 5. | Benlate/Rovral alternate sprays | at 14 day intervals |
| 6. | Benlate/Ronilan alternate sprays | at 7 day intervals |
| 7. | Benlate/Ronilan alternate sprays | at 14 day intervals |
| 8. | Benlate/Benlate/Rovral alternate sprays | at 7 day intervals |
| 9. | Benlate/Benlate/Ronilan alternate sprays | at 7 day intervals |

Rates for all fungicides 100g/100L

There were 6 replications of each treatment. Plots were examined for disease during the growing season. Gross and marketable yields were measured at harvest.

## Results and Discussion:

Analysis of marketable and gross weights of lettuce detected significant differences between treatments at the 1% level. See Table 1 below.

Table 1 - Mean market weight of lettuce harvested (kg/plot)

| Treatment | Mean |
| --- | --- |
| 1 | 0.0 |
| 2 | 8.7 |
| 3 | 10.1 |
| 4 | 12.5 |
| 5 | 2.7 |
| 6 | 15.1 |
| 7 | 5.3 |
| 8 | 12.0 |
| 9 | 13.4 |

L.S.D. = 7.8

Therefore, all treatments bar 5 and 7 were significantly better than the control treatments 6, 9, 4, 8 giving the highest yields. Referring to the list of treatments Benlate/Rovral alternate sprays (7 days), Benlate/Ronilan alternate sprays (7 days) and the combinations of Benlate with every third spray being Rovral or Ronilan, were all as good or better than Benlate sprays alone. Thus in practical terms, either a Benlate/Rovral or Benlate/Ronilan alternating spray program at 7 day intervals could be suggested as an alternative control schedule.

## CONTROL OF SECONDARY BLACK ROT OF CABBAGE - 83MD12

### Introduction:

Black rot (caused by *Xanthomonas campestris* pv *campestris*) is the most serious disease of brassicas in the metro area and cabbage is particularly susceptible. Primary infection can be controlled by hot water treatment of seed but the only treatment available for secondary hydathode infection in the field is the application of copper containing sprays. The efficacy and phytotoxicity of such sprays has long been questioned.

### Materials and Methods:

A trial site at Medina V.R.S. was artificially inoculated with the black rot pathogen by scattering infected cabbage leaves over the trial area and ploughing them in prior to seeding. A randomised block design with six replications and the following five treatments was used:

| | | | |
|---|---|---|---|
| 1. | Copper oxychloride | 200g/100L | |
| 2. | Copper hydroxide (Kocide) | 200g/100L | |
| 3. | Bordeaux mixture | 25g/4L | |
| 4. | Copper oxychloride and Mancozeb | 200g/100L ) ) 200g/100L ) | alternate sprays |
| 5. | Untreated. | | |

The variety of cabbage used was hybrid 240, planted in early autumn and grown to commercial specifications. Plants were scored for visual leaf symptoms just prior to harvest. Gross and marketable yields were calculated at harvest.

### Results and Discussion:

Analysis of variance of weights of marketable cabbage found no significant difference between treatments. However a large amount of black rot was observed in the plots, largely on the lower leaves of the cabbages. A pre-harvest score of the number of plants infected showed differences between plots were significant at the 1% level, as shown below:

| Treatment | Mean Disease Score |
|---|---|
| 1 | 11.83 |
| 2 | 24.00 |
| 3 | 25.33 |
| 4 | 9.50 |
| 5 | 28.33 |

5% L.S.D. = 6.98

Therefore, treatments 1 and 4 (copper oxychloride and copper oxychloride/mancozeb alternating) sprays provide some control of disease spread although this is not reflected in yields in this instance. Nevertheless, in a situation where infection developed earlier or other exacerbating environmental conditions were operating these sprays may be worthwhile. Furthermore less diseased material overall reduces inoculum which can be important in intensive cultivation, short rotation, situations for reducing disease in subsequent plantings.

While there was an early observation of slight yellowing of heads in some treatments and a slightly earlier maturity in some treatments no clear phytotoxic effects were noted at harvest or had any effect on yield.

# CONTROL OF TUBER-BORNE *Rhizoctonia solani* OF POTATOES - 83MD13

## Introduction:

Several trials have been conducted over a number of years using a wide range of chemicals to control tuber-borne *Rhizoctonia solani* on potatoes but no alternative to the current Departmental recommendation has been formulated. That recommendation (0.04% formalin for 90 mins) is unpractical. This trial tested the most practical alternatives available to provide a recommendation for the growers and end the plethora of trials.

## Materials and Methods:

A site at Medina V.R.S. which had been planted to potatoes the previous season was planted in June with Delaware seed tubers with a moderate to high load of *R solani* sclerotes. These tubers had been treated in various ways (Table 1) and were planted into untreated or treated soil (Vapam 450 L/ha).

Table 1 - Tuber Treatments

| No | Treatment | Treatment Time |
|---|---|---|
| 1. | Sodium hypochlorite, 2% for 45 mins | PH |
| 2. | " " " " " | PP |
| 3. | Formalin, 0.04% for 90 mins | PH |
| 4. | " " " " " | PP |
| 5. | Formalin, 2% for 5 mins | PH |
| 6. | " " " " " | PP |
| 7. | Thiabendazole spray 1:20 2 ml/kg | PH |
| 8. | " " " " " | PP |
| 9. | Rovral 1g/L for 2 mins | PH |
| 10. | " " " " " | PP |
| 11. | Mancozeb 200g/kg dust | PP |
| 12. | Untreated | |

where: PH = post harvest
PP = pre-planting

The experiment was in a split plot design with soil treatment as main plot and tuber treatment as sub plot treatments. There were three replications.

A subsample of 5 tubers per treatment was taken and the viability of sclerotes determined. Stem counts were made at emergence; gross and marketable yields were collected at harvest. A harvest assessment of sclerote load on tubers was attempted but sclerote load was too light.

## Results and Discussion:

The assessment of sclerote viability indicated that the formalin treatments were most effective (Table 2), 2% formalin for 5 mins is a viable dipping alternative to the current recommendation and can be done post harvest of the seed tubers or just prior to planting with equal efficacy.

Table 2 - Germination of R. solani Sclerotes post treatment

| Treatment | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean % Germination | 50 | 52 | 20 | 0 | 6 | 8 | 16 | 56 | 46 | 76 | 100 | 100 |

No significant differences were detected between treatments for stem counts at emergence or for yields (total or in various categories) at harvest. However, there was a significant difference between vapam and non-vapam treated areas. Total yield and yield of number 1 grade tubers was higher in the treated areas.

These results question the significance of tuber-borne R. solani to disease damage and yield loss. However, formalin at 2% for 5 mins is a practical dipping recommendation. Soil treatment is not a practical alternative for control of R. solani in commercial fields but serves to illustrate the importance of rotation to decrease soil-borne inoculum.

## CONTROL OF DOWNY MILDEW OF ONIONS - 83MD14

### Introduction:

As a result of many reports in the 1982 Spring season of failure of chemical treatments to control downy mildew in onion crops in the metro area, registered chemicals currently available were tested in a trial area at the Medina Vegetable Research Station in the spring season of 1983.

### Materials and Methods:

Early creamgold onions were grown as a spring/summer crop at Medina V.R.S. to commercial specifications. Six fungicide treatments were tested in a randomised block design, six replications per treatment. Treatments were:

| | | g/100L water | |
|---|---|---|---|
| 1. | Ridomil MZ | 350 | curative rate |
| 2. | Ridomil MZ | 250 | prophylatic rate |
| 3. | Mancozeb | 200 | |
| 4. | Kocide | 200 | |
| 5. | Copper Oxychloride | 200 | |
| 6. | Antracol | 200 | |

No unsprayed treatment was included due to the high risk of inter-plot interference as the fungus involved (Peronospora destructor) spores profusely and is spread aerially.

Chemicals were sprayed at seven day intervals from the first signs of disease, six sprays were applied per treatment. Plants were inoculated with a spray of downy mildew spores just prior to the first spray application (post thinning).

Plants were scored on a plot population basis on a scale of 0-4 (0 - no symptoms, 100% infection), scores were uniformly low throughout. Plots were harvested and the centre 4 metres of the two centre rows of each plot were graded into the following categories:

Reject, Picklers, Small, Medium, Number 1, Large.

The latter 3 categories were later totalled to give saleable yield.

### Results and Discussion:

Significant differences were detected between treatments in total yield (1% level) and saleable yield (5% level). Duncan's multiple range test gave the rankings shown in Table 1.

Table 1 - Mean yields of onions (kg/plot)

| Treatment | Mean Saleable Yields | Mean Total Yields |
|---|---|---|
| 2 Ridomil MZ 250g/100L | 27.10 a * | 34.52 a |
| 1 Ridomil MZ 350g/100L | 26.77 a | 33.80 a b |
| 6 Antracol | 25.12 a b | 32.65 a b c |
| 3 Mancozeb | 24.27 a b | 31.76 b c d |
| 4 Kocide | 22.15 b | 30.18 c d |
| 5 Copper oxychloride | 21.89 b | 29.37 d |

* Figures within a column followed by the same letter are not significantly different.

Rankings for both saleable and total yields were the same. Copper formulations performed consistently more poorly than other fungicides. Ridomil MZ performed well, however there was no significant difference between the two rates of Ridomil MZ or between Ridomil MZ and Antracol.

While there is no untreated comparison there was little downy mildew observed in any plot and all fungicide treatments gave very similar results. Note that the incidence of downy mildew in spring metro onion crops in 1983 was much lower than in the previous season. These results do not indicate a resistance problem with any of the chemicals and there does not appear to be a case for increasing the recommended rate of Ridomil MZ.