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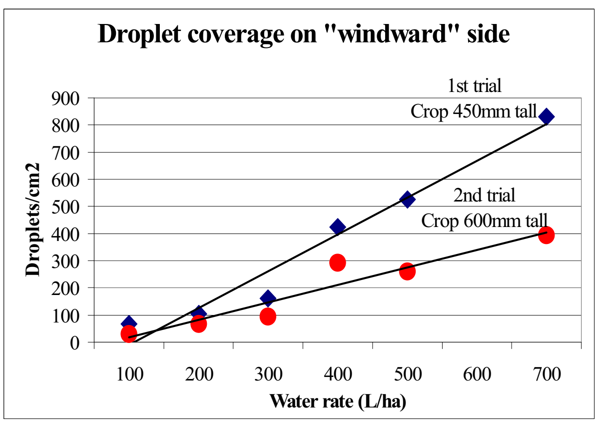
National Vegetable Industry Centre Newsletter

Spray application trials in onions

Tony Napier – NSW DPI

Onion thrips are a major pest in onions and are usually controlled by applying multiple applications of insecticides throughout the growing season. For any insecticide application to be effective there needs to be adequate spray coverage over the entire plant. A major influence on spray coverage is the water rate applied per hectare when applying the insecticide. A number of trials were conducted at Yanco Agricultural Institute during the 2005 growing season to help determine the most appropriate water rate to use when making insecticide applications on onions.

Two trials were conducted to evaluate six different water rates, from 100 to 700 L/ha. Both trials were conducted in a crop of Mellow Yellow using a conventional spray boom fitted with cone nozzles at 500mm spacings. The first trial was conducted when the crop was about 450mm high and the second trial was conducted 4 weeks later when the crop was about 600mm high. The boom applied a fluorescent dye to the onions at a rate of 200:1 in water. After the foliage had dried, whole plant samples were cut and taken back to the lab for assessment. Samples were assessed using a black light in a darkened room where visual estimates were made on the number of droplets seen per cm^2. The number of droplet/cm^2 needed for good efficacy against thrips with currently registered chemicals is not known. A general recommendation for most insecticides is to use a fine droplet spectrum with coverage of 100 to 200 droplets/cm^2.



Assessment of spray coverage was made at 6 different sites on every onion plant, including the windward and downwind sides and between the middle leaves. The windward side of the plant captures the most droplets due to movement of spray equipment and breeze.

The windward side of the onion plants generally reached the desired rate of droplet coverage between 200 and 400 l/ha. The spray coverage results showed a decrease in droplet numbers as the crop growth increased. These trials indicated a water rate of 200 to 250 L/ha is required to obtain an adequate spray coverage when a onion crop is about 450mm high and a water rate of 250 to 350 L/ha when the crop is about 600mm high.

The trials also showed that spray coverage was generally ten times greater on the outside leaves compared to the spray coverage on the inside middle leaves. Spray coverage was also consistently much lower on the downwind side as compared to spray coverage on the windward side. Further water rate trials will be conducted next year using biological counts to determine appropriate water rates. For more information contact the District Horticulturist at Yanco Agricultural Institute on 02 6951 2611

Maximising irrigation water

Mark Hickey – NSW DPI

The recently completed NSW DPI managed project *"Australian vegetable crops – maximising returns from water'* presents a detailed description of water use in the major vegetable production regions and associated river catchments. Funded by Horticulture Australia, and involving other state agencies and CSIRO, the report highlights the advances and investments made by the vegetable industry in recent years which has enable it to achieve high water efficiencies. The relatively low water use by the vegetable industry is contrasted with the high value of outputs from the vegetable industry on a national basis, and the report provides a description of market orientation including domestic, processing and exports.

According to ABS figures, in 2001 the vegetable industry was valued at around $2.1 billion, provided jobs for over 45,000 people through direct on farm and indirectly through downstream industries, and used just 564,750 megaliters (ML) of water. Nationally, this equates to $7.7 million of total regional output, and 80 jobs for every 1,000ML of water used by the vegetable industry in Australia.

The value return from vegetable production per ML increased from $1,762/ML in 1996/97 to $3,207/ML in 2000/01 (ABS 2001). The productivity increase achieved by the vegetable industry can be partly attributed to increased use of water efficient delivery systems such as drip irrigation, increased use of re-cycling on farm, wide scale adoption of irrigation scheduling and soil moisture monitoring and a tendency towards whole farm planning and soil mapping. Although more difficult to measure, some part of that increase in product value is most likely related to quality improvements as a direct result of improved irrigation practices.

Technology case studies were conducted with vegetable growers detailing the costs and benefits which flow from a shift to more efficient irrigation systems, demonstrate real investments being made in the industry at farm level. The report also identifies issues for possible future research, which are likely to maximise returns on grower investment of research and development funds.

The report will act as key reference on resource utilisation for the Australian Vegetable Industry for many years to come, and points the way for further improvement to be made in an already water efficient industry. For more information on the national water report for vegetables, contact Mark Hickey at Yanco Agricultural Institute on 02 6951 2611.

Downy mildew management in onions

Andrew Watson – NSW DPI

The 2006 Riverina onion crop is similar in acreage to last year's crop with more hybrid varieties now being grown. Most Riverina crops look very good at this stage with a few paddocks having some weed problems. Although the season has been dry up until now, the weather can quickly change. Onion growers will soon need to start thinking about their downy mildew management.

Downy mildew (DM) is first seen as brownish-purple velvet-like tuffs on the leaf tissue. Pale lesions then begin to form on the leaves that gradually turn yellow followed by a brown necrosis resulting in the collapse of the leaf tissue. DM infections usually start as small patches in a field than rapidly progress throughout the whole paddock. DM seldom kills onion plants, but bulb growth may be reduced. Bulb tissue, especially the neck, may become spongy and the bulb may lack keeping quality.

DM overwinters primarily as mycelium in infected onions that remain in onion fields or in nearby cull piles. When favourable environmental conditions occur, the overwintering fungal mycelium start producing spores. After dissemination through the air, these spores infect the leaves of onion plants. Spores are formed at night when high humidity and temperatures of 4–25º C occur. The spores mature early in the morning and are disseminated during the day. Spores remain viable for about 4 days. Germination occurs in free water from 1–28º C. Rain is not needed for infection if heavy dews occur continuously during the night and morning hours. The mycelium of DM in leaves of infected onion plants produces a new crop of spores called conidia in cycles of approximately 11–15 days. As the upper portions of a leaf are killed, the fungus infects the next lower part of the leaf in each successive cycle of spore formation. Such cycles can be repeated several times until the leaf is completely killed.

Check list for onion Downy Mildew management.

Minimise infection source **-** Destroy volunteer onions as these are a source of new infections. Ensure that the previous crop's trash has been well incorporated during summer.
Monitor **-** The disease starts in patches so monitoring needs to be conducted across the whole paddock. Look for grey coloured tufts on leaves, especially in the morning, as the best time to see the disease.
Fungicides **-** Protective fungicides are available and need to be applied before the disease becomes too severe. Curative fungicides are available but should be used minimally. Fungicides should be applied before an irrigation, especially if applied by ground rig.
Warm humid/moist weather **-** Will encourage the disease.
Hot dry weather **-** Will control the disease.

Downy mildew symptoms

For more information or diagnostic support, contact Andrew Watson, Plant Pathologist at YAI on 02 6951 2611.

Pumpkin variety trial in the MIA

Tony Napier & Dr Mohammad Quadir – NSW DPI

A pumpkin variety trial was conducted during last season at Roy Schrippa's property in Whitton. The trial included all the major varieties of Greys, Japs and Butternuts currently grown in the MIA. The trial was sown towards the end of the sowing season on the 22nd November 2005. Plots were harvested for yield, brix and fruit numbers on the 22nd May 2006. Only fruit larger than 1.5kg were weighed for Grey and Jap types while only fruit larger than 1.0kg were weighed for butternut types. All fruit above the minimum weight limit was harvested; no fruit was rejected for yield assessment due to poor appearance, blemish, misshapen or other cosmetic defects.

The Greys and Japs were all sown 1.0m apart while the Butternuts were all sown 0.5m apart. Plant spacing has a large impact on fruit size, number of fruit per hectare and total yield. Yield can be maximised for all varieties if planted at the optimum spacing (eg: the smaller sized greys may require a closer plant spacing than the larger types). The market also has preferences in fruit size and shape (eg: Butternuts between 1.5 and 2.0kg are the preferred size for most fresh market outlets).

The trial was replicated with four 18m^2 plots established for each variety. The open pollinated types exhibited much more variation within each variety than the hybrid types. The high variation of the open pollinated varieties caused a high coefficient of variation resulting in large groups of significantly similar varieties.

Table 1: Results of MIA pumpkin variety trial (2005/06)

Seed source	Type	Variety	Yield (T/ha)	Average size of largest 20 fruit (kg)	Number of fruit (per ha)
Henderson Seeds	Grey (H)	Early Jarragrey	70.3 d	5.50 e	19841 bc
Jarit	Grey (H)	Sweet Slice	63.4 cd	5.54 e	17205 abc
Jarit	Grey (H)	Gunsynd	56.8 bcd	5.38 de	17066 abc
Terranova	Grey (H)	Sweet Grey	46.0 abcd	3.65 bc	15818 ab
Terranova	Grey (OP)	Jarrahdale Large	45.5 abcd	4.68 cde	13043 ab
Terranova	Butternut (H)	Matilda	44.3 abc	2.69 ab	25114 c
Henderson Seeds	Grey (H)	Maverick	41.2 abc	3.69 bcd	15401 ab
South Pacific Seeds	Grey (OP)	Jarrahdale	39.4 abc	4.70 cde	9990 a
South Pacific Seeds	Grey (H)	Dulong	35.9 ab	3.64 bc	12626 ab
South Pacific Seeds	Butternut (H)	Sunset	30.2 a	1.86 a	19703 bc
South Pacific Seeds	Japanese (H)	Kens Special Hybrid	27.7 a	3.37 abc	9435 a
Lefroy Valley	Japanese (OP)	OOAK	25.0 a	3.10 abc	9158 a
South Pacific Seeds	Japanese (OP)	Joker	24.3 a	3.01 abc	9158 a
Terranova	Butternut (OP)	Butternut Large	22.0 a	1.82 a	14708 ab

(OP) = Open Pollinated type (H) = Hybrid type
Numbers in the same column sharing a commen letter are not significantly different by Tukey's test at P = 0.05

After harvest, 20 of the largest fruit from each variety were stored for later assessments on storability, shape and colour. The visual assessments were made on the 10th August 2006 (about 11 weeks after harvest). The visual assessments were not analysed as part of the replicated trial but made for general information only.


Dr Quadir inspecting pumpkins held in storage for 2½ months

Japanese types: There was no observable difference between the three Jap varieties in shape and colour. The three varieties each have a big variation in colour with some fruit still very green and others losing colour and looking pale and bleached.

Butternut types: Matilda had the longest fruit followed by Sunset while Butternut Large had the shortest fruit. Matilda had deeper and more pronounced ribbing than the other two butternut types with a larger headstock (stalk thickness). There was only a slight difference in colour between the three butternut types with the majority of fruit having a similar orange colour with a few from each variety looking slightly yellow. Many of the Butternut Large fruit had some green striping on the shoulders near the headstock end.

Grey types: Jarrahdale, Jarrahdale Large and Maverick had all lost their grey colour during storage and appear pink. Dulong was starting to loose its grey colour and developed a reddish tone on the shoulders. Gunsynd, Sweet Slice, Sweet Grey and Early Jarragrey were holding their colour and still looked grey. Maverick and Dulong have a Jarrahdale appearance with prominent ribbing and segmentation. Sweet Grey and Sweet Slice have the least ribbing and segmentation of any of the grey types and appear quite smooth. For more information contact the District Horticulturist at Yanco Agricultural Institute on 02 6951 2611.

Northern Leaf Blight in processing sweet corn

Andrew Watson – NSW DPI

Northern leaf blight (NLB) of sweet corn is caused by the fungus, *Exserohilum turcicum* and usually infects the lower leaves first then progresses to the middle and upper leaves. The fungus, once it infects causes elongated necrotic lesions on the leaves. If allowed to progress the lesions can cover all the leaf and subsequently reduce photosynthetic area and yields. *Exserohilum turcicum* carries over from one season to the next as mycelia (fungal strands) and conidia (small spores or fruiting structures) on leaves from the previous season. The conidia can be carried from the old blocks to a freshly planted blocks by wind and then from lesion to lesion within the new block. Infection occurs when conditions become moist from rain, irrigation or dew.

Most information on yield loss caused by NLB relates to maize. In overseas studies on yield reductions in maize, severe blight 2-3 weeks after pollination reduced yield by 40-70%. If the disease did not become severe until 6-8 weeks after pollination, yield was not affected. Another study found that yield was reduced about 0.2% for each 1% increment in severity of NLB at 3-4 weeks after mid silking. Yield losses in susceptible varieties of sweet corn are commonly around 15 to 20% when the disease levels reach 20 to 50%.

Chemicals available for controlling plant diseases can be divided into two groups. There are those that provide protection to leaves and need to be applied thoroughly and regularly to cover new leaves. These chemicals are often referred to as protective. The others type are systemic fungicides and have some capacity to move systemically through the leaves. Early detection of the disease and monitoring its spread is important when undertaking a chemical control programme. Currently chlorothalonil is registered for NLB control and in 2005 a permit was approved for propiconazole. The latter fungicide has more curative and systemic activity than chlorothalonil.

NSW DPI has just completed a study of NLB and recently submitted the final report to HAL. For further information on NLB or a summary of the final report, contact Andrew Watson at Yanco Agricultural Institute on 02 6951 2611.

Hygiene in the onion shed

Dr Elena Lazar – NSW DPI (Gosford)

Each year, a percentage of onion bulbs are lost due to breakdown and rots in the shed, or at worst in the marketplace after packing. Even when onions come in from the paddock clean, they are still prone to infections through disease organisms present in bins, grading plants, and shed floors. Good shed hygiene is essential to help minimise the impacts of post-harvest diseases such as *Aspergillus* black mould, botrytis neck rot and bacterial "soft rot" infections. Below is simple guide to help prevent such losses.

Prior to Harvest

- ✓ Remove all debris including old onion bulbs, soil and other left over plant material from last season. The shed should be thoroughly swept out and washed down using a high pressure hose.
- ✓ Use a high pressure hose over the grader to remove any loose material
- ✓ Using soap and water, scrub grading line from one end to the other. Ensure any scale on metal or rubber belts is scraped off and removed. Disease spores can be trapped in this material and are a potential source of infection.
- ✓ Use sodium hypochlorite (bleach) or some other cleansing agent to wash down all parts of the grader. Make sure workers are using adequate protective clothing (ie gloves, boots, eyeglasses, face masks etc). This material has an irritant vapour, and caution should be taken when using. A 5% solution of a common household bleach should be adequate.
- ✓ Thoroughly clean bins used for transport or storage of onions, preferably by dipping in a cleansing solution. Plastic bins are much easier to clean than wooden bins and will dry quicker and less likely to harbour rotting plant material.

During the Harvest

- ✓ Avoid at all costs, harvesting any diseased bulbs into bins. Growers need to ensure pickers are instructed to leave any diseased bulbs in the field. Transporting these bulbs to the shed will only re-infest bins and grading line.
- ✓ Minimise puncture wounds, cuts or trimming necks too short during hand harvest. Any damage to skins can result in secondary infections, which could spread to other bulbs.
- ✓ Ensure good ventilation from the packing line to minimise settling of disease spores on equipment. Use extraction fans on grading lines to suck loose material off bulbs and dump well away from the shed.