tive was hand watering, but as my small operation is run by my wife, when she is available outside business working hours, and myself, the time required to hand water made my present system the only option.

Capital cost of my system is fairly high, but the running costs balance the equation. It also allows me the opportunity to do other jobs or take time out and, most importantly, it has no effect on the environment whatsoever!

Igloo Irrigation©

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INTRODUCTION

To achieve even watering in polyhouses many systems are installed with a single line of inverted sprinklers so close together that the application rates are well in excess of the potting media absorption rate. This leads to excessive water use and leaching of nutrients that both affect the bottom line.

When irrigating containers with overhead sprinklers in polyhouses it is important to:

- Select sprinklers that apply water at a rate that suits your crop.
- Match application rate to the absorption rate of the potting media.
- Select a layout and sprinkler that achieves even watering.
- Select a layout that eliminates dry spots.

What Crop Are You Growing? Small seedlings and plug trays are best watered at application rates less than 5 mm h^{-1}. General stock lines are better watered closer to the potting media absorption rate between 7 and 10 mm h^{-1}.

Potting Media Absorption Rate (MAR). Your application rate should match the absorption rate of your potting media. For most pine bark mixes MAR is between 10 and 12 mm h^{-1}. The new edition of *Managing Water in Plant Nurseries* details a simple field test to allow you to determine the water absorption rate of your mix.

Layout Design and Sprinkler Selection. When selecting a sprinkler layout always ensure that each plant/container receives water from four sprinklers matched to give an even coverage. This is the only way you can achieve even watering and reduce dry spots, overwatering, and excessive leaching. The Coefficient of Uniformity (CU) of the selected sprinkler and spacing measures how evenly water is applied to the area. It is measured as a percentage. Your selected sprinklers should have a CU higher than 85%.

Eliminate Dry Spots. Correct sprinkler selection, operating pressure, and layout should also eliminate dry spots in the polyhouse. To check that you have selected a good combination examine the Scheduling Coefficient (SC). This is used as a multiplier to determine how long to run the sprinkler system to apply enough water to the driest 2% of the area. Your selected sprinklers should have a SC value of 1.1 to 1.5.

Overhead Sprinkler Layouts. For each plant/container to receive water from four sprinklers, full-circle sprinklers will be located around the outside edge of the polyhouse with additional rows installed internally on the large structures. Most of the excess water around the edges will mist off the polyhouse sides and end up in the drainage system. Although this seems like a waste of water, the even watering produced will reduce your irrigation time and save you substantial water overall. If the outside row of plants is receiving excess from water deflected from the sides then install some hessian or shadecloth along the spray line. This will absorb the spray pattern returning the water to the drain below.

LET'S LOOK AT SOME TYPICAL POLYHOUSES AND IGLOOS

Igloo 1. Tunnels 4.2 m wide × 21 m long. Select a sprinkler spacing of 4.2 m × 4.2 m with a row of sprinklers down each side of the tunnel as shown in Fig. 1. This will require 12 sprinklers installed on risers of suitable height.

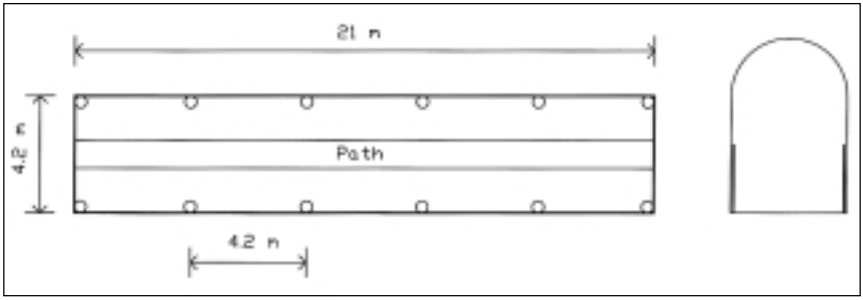

Figure 1. Igloo 1.

Some recommended sprinkler options suitable for seedlings or plug trays for this 4.2 m × 4.2 m sprinkler spacing:

Sprinkler make and model	Jet	Discharge litres·h^{-1}	Pressure kPa	MAR mm·h^{-1}	CU (%)	SC
Wingfield Challenger II	1.3	82	200	4.4	92	1.2
Hardie waterbird V	1.25	89	200	4.8	92	1.2
Eindor 841	green	90	200	5.1	92	1.2

Some recommended sprinkler options suitable for general nursery lines for this 4.2 m × 4.2 m sprinkler spacing:

Sprinkler make and model	Jet	Discharge litres·h^{-1}	Pressure kPa	MAR mm·h^{-1}	CU (%)	SC
Naan mini	light green	160	150	7.3	91	1.3
Antelco Rotor Rain	blue	145	200	7.5	98	1.2
Eindor 841	green	90	200	5.1	92	1.2

Correct pressure is critical to meeting these performance targets. You must be able to measure and adjust sprinkler-operating pressure or you will be disappointed.

Igloo 2. Tunnel or polyhouse with vertical sides 6 m wide × 30 m long. Select a sprinkler spacing of 5 m down each side of the length of the structure as shown in Fig. 2. This will require 14 sprinklers installed on risers of a height to suit the crop.

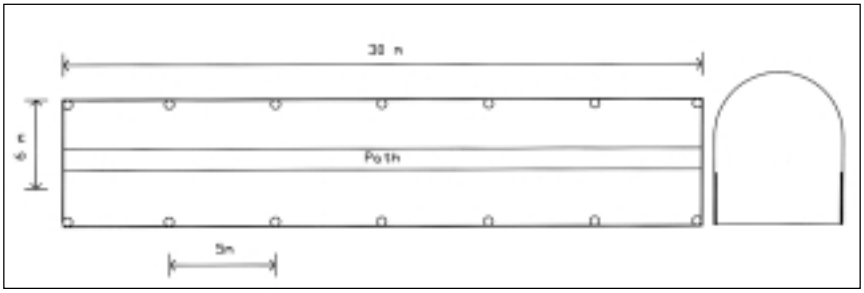

Figure 2. Igloo 2.

Some recommended sprinkler options suitable for seedlings or plug trays for this 6 m × 5 m sprinkler spacing:

Sprinkler make and model	Jet	Discharge litres·h^{-1}	Pressure kPa	MAR mm·h^{-1}	CU (%)	SC
Wingfield Challenger II	1.8	171	200	5.5	92	1.3
Plastro Rondo AA	1.8	173	200	5.7	86	1.4
Antelco Rotor Rain	grey	202	250	6.3	93	1.3

Some recommended sprinkler options suitable for general nursery lines for this 6 m × 5 m sprinkler spacing.

Sprinkler make and model	Jet	Discharge litres·h^{-1}	Pressure kPa	MAR mm·h^{-1}	CU (%)	SC
Plastro Rondo AA	2.2	256	200	8.4	91	1.3
Dan big orange swivel	Red	257	200	8.5	91	1.3
Hardie waterbird V	2.3	304	200	9.7	93	1.2

Correct pressure is critical to meeting these performance targets. You must be able to measure and adjust sprinkler-operating pressure or you will be disappointed.

Igloo 3. A polyhouse with 3 m vertical sides, 6 m wide and 30 m long could be fitted out with benches as shown (Fig. 3) and irrigated with a 3 m × 3 m layout offset by 1.5 m. This will require 32 sprinklers installed on rigid risers of a height to suit the crop, fixed to the benches.

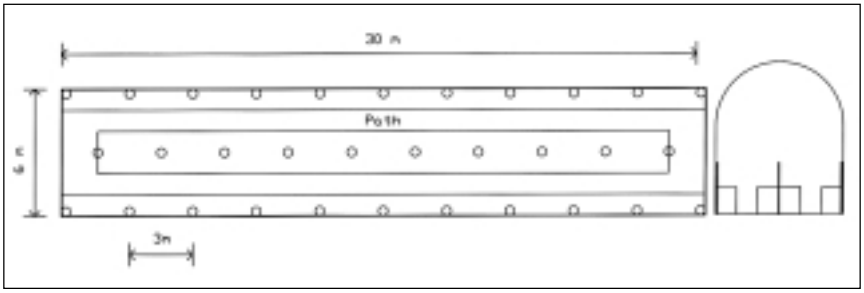

Figure 3. Igloo 3.

Some recommended sprinkler options suitable for seedlings or plug trays for this 3 m × 3 m triangular sprinkler spacing,

Sprinkler make and model	Jet	Discharge litres·h^{-1}	Pressure kPa	MAR mm·h^{-1}	CU (%)	SC
Dan 1 sided black swivel	brown	43	200	4.8	91	1.1
Eindor 841	olive	50	200	5.2	95	1.1
Wingfield Challenger II	1.1	56	150	6.3	90	1.3

Some recommended sprinkler options suitable for general nursery lines for this 3 m × 3 m triangular sprinkler spacing:

Sprinkler make and model	Jet	Discharge litres·h^{-1}	Pressure kPa	MAR mm·h^{-1}	CU (%)	SC
Philmac micro spin	1.3	82	200	9.5	92	1.5
Hardie Waterbird V	1.25	89	200	9.4	93	1.2
Eindor 862	green	90	200	9.4	98	1.1

Correct pressure is critical to meeting these performance targets. You must be able to measure and adjust sprinkler-operating pressure or you will be disappointed.

Calculating Run Times from Performance Data. The calculation is as follows, using the last sprinkler (Eindor 862) from the table above as an example:

Amount to be applied (5 mm) divided by MAR (9.4 mm·h^{-1}) multiplied by SC (1.1) multiplied by 60 equals run time in minutes (35 min). Increasing MAR will reduce the run time until you exceed the potting mix ability to absorb water. Few mixes absorb water faster than 10 to 12 mm·h^{-1}. The SC is also critical to run time and many systems in common use have a SC of over 2.5.

The Bottom Line. Conventional layouts that have a single inverted row of sprinklers along the middle of the poly tunnel are usually placed at 0.5 to 1 m centers to achieve even watering at the edges. This produces mean application rates more than twice the absorption rate of most potting media. This uses double the water, produces double the nutrient leaching, and requires two to three times as many sprinklers as the layout shown above. Changing your layouts and sprinklers can save you money in water, fertilizer, and dispatch costs, producing plants faster for a higher turnover.

ADDITIONAL READING

Rolfe, C. 2000. Managing water in plant nurseries. 2nd Ed. Nursery and Garden Industry Australia.