

KIWI POLLEN

MAIN ROAD NORTH, P.O BOX 200, TE PUKE, NEW ZEALAND

PHONE 0064-07-573-5100 FACSIMILE 0064-07-573-5101

www.kiwipollen.com

POLLENAID APPLICATION

TECHNICAL GUIDE

CONTENTS - POLLEN APPLICATION

<u>1</u>	<u>INTRODUCTION</u>	3
<u>2</u>	<u>MIXING & SPRAYING</u>	4
<u>2.1</u>	<u>General</u>	4
<u>2.2</u>	<u>Deionised Water</u>	4
<u>2.3</u>	<u>PollenAid Suspension Medium</u>	5
<u>2.4</u>	<u>PollenAid Mixing</u>	5
<u>2.5</u>	<u>Care of Pollen</u>	7
<u>2.6</u>	<u>Useful Data</u>	7
<u>2.7</u>	<u>Timing of Spraying</u>	8
<u>2.8</u>	<u>Spraying Flowers</u>	8
<u>3.0</u>	<u>POLLENAID MIXER</u>	9
<u>I</u>	<u>APPENDIX</u>	10

1 INTRODUCTION

Pollination is one of the key annual events in the production of a kiwifruit crop. In the most general sense pollination is simply the transfer of pollen from the anthers of male flowers to the stigmas of female flowers. For kiwifruit, however, the quantity of pollen transferred and its quality on arrival are of paramount importance.

Fruit weight at harvest is related to the number of seeds in the fruit. An individual fruit can contain up to 1400 seeds. For fruit on mature vines, at least 800 seeds must be present if the fruit is to reach the minimum weight for export (80g) and at least 1150 seeds if the fruit is to reach the preferred 33-36 tray count weight (100-110g). To obtain these seed numbers, more than 12 000 viable pollen grains must be transferred during pollination. However, if the pollen arises from superior males (M51, M52, M56 and Chieftain) less pollen is needed and 4 000 - 6 000 pollen grains per flower will yield 800 to 1000 seeds.

In New Zealand, in years when honey bee activity is limited by cool, wet or windy weather pollination can be affected adversely and many fruit fail to reach exportable weight. Similarly, if honey bees are attracted out of the orchard to neighbouring pasture or other flowering plants then insufficient pollination occurs and crop losses result. In growing areas which rely on wind pollination, the application of additional pollen can result in significant improvements in fruit size.

Research by Dr M E Hopping, Ministry of Agriculture and Fisheries at Ruakura, has resulted in an alternative pollination system (spray pollination) to that offered by bees. Spray pollination can set routinely 95% of the flowers on a vine and result in at least 90% of these fruit reaching exportable weight. The technique involves collecting pollen from male vines, suspending it in PollenAid suspension and then spraying the pollen onto female flowers. Spray droplets containing pollen have more mass than dry pollen alone and are therefore less affected by wind and rain during application. Therefore this technique can be used in all weather conditions.

Acknowledgement:

Dr M E Hopping, New Zealand.

2 MIXING & SPRAYING

2.1 General

Although pollen looks like an inert wettable powder, it is in fact composed of many individual pollen grains which are single living cells. When placed on the stigma of a Hayward flower each pollen grain produces a pollen tube which grows through the stigma into the style, down the style into the ovary, and through the ovary to reach the ovules. The pollen tube enters the ovule and as a result of this fertilisation a seed is produced.

It is of vital importance that the pollen be kept alive during transfer to the stigma surface. The steps outlined below have been carefully developed to ensure the maximum number of pollen grains survive the transfer (spraying) operation. Failure to meet the following criteria will result in a pollination failure.

2.2 Deionised Water

Metal ion contamination of water supplies results in rapid death of pollen. Metal ions of zinc, copper, aluminium and iron are particularly harmful. To rid water supplies of these metal ions, water must be passed through an ion exchange resin and then stored in food-grade plastic drums.

Deionising Process:

Load the deioniser unit with resin (see manufacturer's instructions) or use a sealed cartridge and attach the input hose to a cold water tap and turn on. Check the flow rate with the manufacturer's specifications. Exit water will be free of metal ion contamination and should be stored in a food grade plastic (polyethylene) container.

Use a conductivity meter to check the purity of the water. Water should have a conductivity of less than 1.0 micro siemens per centimetre.

2.3 PollenAid Suspension Medium

If pollen is suspended directly in de-ionised water it will quickly swell and burst because of osmotic differences between pollen and water. A suspension medium called **PollenAid™** has been developed which keeps pollen alive in solution.

It is important to mix well, the PollenAid concentrate, marker dye and deionised water before adding pollen. Mixing devices must be non-metallic. Use a PollenAid mixer or hand shaker. Do not use vigorous agitation such as a kitchen food processor. This will damage the pollen.

The standard mix for PollenAid is:

1 litre Deionised Water

20ml PollenAid

4-5 ml Marker Dye

4g of Pollen

The water, PollenAid®, and Marker Dye may be pre-mixed and stored for 2 days.

The concentration of pollen can be altered if the PollenAid rate is adjusted in the same ratio.

2.4 PollenAid Mixing

- Always mix PollenAid suspension and marker dye in deionised water before adding pollen.
- Add pollen and agitate for 10 minutes or until a uniform suspension is obtained.
- Apply Pollen within 60 minutes of mixing. Pollen death occurs rapidly after sixty minutes in solution.

The type of mixer will depend on the size of your spraying operation. The volume of the mix can be as small as a 1 litre, shaken by hand or as large as a 10 litre drum with electric motor mixer.

To ensure no possible errors occur, apply pollen suspension mix within 60 minutes of mixing.

The following points are important to pollen mixing:

- DO NOT pump pollen suspension through centrifugal, piston, or diaphragm pumps. Pollen is rapidly damaged and dies;
- DO NOT mix up more pollen than can be sprayed within 60 minutes.
- DO NOT let the pollen settle out of suspension.
- DO NOT leave the mixing tank or sprayers unwashed at the end of the day. Wash out all equipment with de-ionised water. Rotting pollen smells terrible.
- DO NOT mix at higher than 1000 rpm and do not subject to pressure greater than 30 psi.
- DO NOT use utensils, containers or material that comes in contact with the PollenAid solution unless they are made of stainless steel or new, food grade plastic.
- DO NOT use your Kiwi Pollen Sprayer, Cambrian or Airshear for any material other than PollenAid. Rinse only with deionised water.

Pollen-PollenAid suspension must be applied within 60 minutes of mixing.

2.5 Care of Pollen

Pollen is a living plant material and must be handled with care:

- Always use clean, dry glass or plastic storage containers.
- When freezing pollen ensure container is well sealed and for long term storage 20% relative humidity and -18° C is recommended.
- Thaw pollen for at least one hour , not above 18°C, when removed from freezer for use. Never leave pollen in direct sunlight.

2.6 Useful Data

- Pollen usage:

Air Shear Sprayer 1.5g Pollen per 1000 flowers

Cambrian: this method of spraying will use more pollen per hectare – the Cambrian sprayer is not as efficient as the droplet size is larger. The Cambrian sprayer will require 3.0 gram of pollen per 1000 flowers.

Refer Kiwi Pollen Sprayer, Tractor Airshear and Cambrian Manuals for details.

- Non Hi-Cane vines will need 3-4 sprays 3 days apart. Hi-Cane vines, 2 sprays 3 days apart.
- Wet flowers can be sprayed but not flowers so wet that water drops from stigmas. Each flower should be sprayed only once and this is where using a dye is valuable. For older flowers where any part of the stigma is white, there is still some receptivity to male pollen, i.e. any flower can be sprayed, provided stigmas have not gone brown/black.

- Labour & Pollen Rates - General Data
 - 70 Flowers sprayed/min (season average)
 - 100 Flowers sprayed/min (rate at peak flowering)
 - Average spray time: 12 mins/ 20 m² vine /operator
 - Average Pollen usage - Cambrian: 840g/ha
 - Tractor Airshear: 420g/ha
 - Kiwi Pollen Sprayer: 420g/ha

2.7 Timing of Spraying

Each flower should be sprayed within 3 days of opening for best results. Flower spraying can begin at 10 % opening and a return pass made every 3 days until all flowers have opened and been sprayed. Flowers retain a degree of receptivity to pollen as long as some of the stigmas are still white.

2.8 Spraying Flowers

The correct spraying distance is 100mm (4 inches) from the nozzle to the flower. Each flower needs 0.25 seconds of spray (for the Kiwi Pollen Sprayer). Do not spray to run off. Only a light spray is required.

Where several open flowers are hanging together they can be sprayed without releasing the trigger. Check that each operator is spraying groups of flowers for 0.25 seconds x number of flowers. There is a tendency when spraying to "get in a groove" spraying for 0.25 seconds per flower then for a bunch of flowers to spray for the same time (0.25 seconds). A bunch of four open flowers requires a full second of spraying.

3.0 POLLENAID MIXER

A 12v DC system designed specifically for the correct mixing of Pollen in PollenAid solution. It is suitable for mixing volumes from 1 to 10 litres.

Use the small impellor for 1 – 5 litres. Use the large impellor for 5 – 10 litres.

During mixing it is common for the froth to build up on the solution surface. This contains only small amounts of Pollen. Small globules of Pollen will be evenly disbursed throughout the solution. Mixing is complete when these become very small or disappear.

I APPENDIX – POLLENAID LABEL