



Substrate Nutrition Guidelines- PSI Raspberry Varieties

Introduction

The new PSI Raspberry varieties Nobility, Ovation, Paragon and Majestic represent an improvement over the current range of open market varieties, in terms of cropping system flexibility, timing, yield and quality. They represent an economic alternative to restricted varieties (e.g. Maravilla, Diamond Jubilee).

Paragon is a variety with top-tier potential due to excellent flavour but more moderate yield potential than Ovation. Like Ovation and Majestic, Paragon is probably best suited to long cane production from cold store, although it is adaptable to other production systems. The variety benefits from easy picking and management, and good shelf life.

Nutritional Guidelines for Cropping as a Primocane, or for Long Cane (Nursery) Cultivation

This section contains nutrition guidelines for all PSI varieties grown from tray plants, roots, tips or other material producing Primocanes to crop in the same year, or to produce long canes in the Nursery, to crop the following year.

- When grown as Primocanes, the new PSI varieties are moderately vigorous and benefit from a lower Nitrogen feeding programme in order to control internode length and branching.
- In cases where additional cane development is required, it is possible to add up to 2 mmol/litre of Ammonium-N to the recipe.

It is important to plant into well buffered coir substrate. Starter feed K/Ca ratio should be in the range 0.9-1.1 during the establishment and vegetative growth phase in order to minimise tip burn and promote good vegetative growth. During the fruiting phase, a target drip K/Ca ratio of between 1.8 and 2.0 is sufficient unless the crop load is very heavy.

- Drip pH should be 5.1-5.3, in order to ensure good Iron/Manganese availability.
- Aim for a drip + drain EC Sum of 2.8-3.4 mS during the vegetative phase and 3.6-4.2 mS during the fruiting phase.
- Maintaining too high an EC Sum can result in over-vegetative growth during the vegetative phase, and reduced fruit size during fruiting.

Whilst restriction of water and EC is sometimes used with Primocane crops and long cane production to reduce over extension of internodes, it is important to give sufficient runoff to control substrate and drain EC, and to prevent the build-up of Sodium and Chloride in the substrate (neither of which contribute to plant nutrition).

- Aim to vary runoff with weather conditions, aiming for 5-10% runoff during dull/cloudy weather and 15-25% run off during sunny weather from establishment through vegetative growth
- (adjust to 10-15% and 20-30% respectively during fruiting).

For optimum results, drip fertilizer recipes should be calculated according to substrate and background water supply. Guidelines on nutrient targets are given in the table below:

	NO ₃ -N	NH ₄ -N	P	K	Ca	Mg	S	Fe	Mn	Zn	B	Cu	Mo	EC feed (mS)	EC sum (mS)	pH
- Vegetative	10.0	0.2	1.3	3.6	3.4	1.6	1.3	35.8	18.2	7.7	13.0	1.9	0.5	1.4	3.0-3.6	5.3
- Fruiting	11.7	0.3	1.2	5.8	3.0	1.4	1.0	35.8	18.2	7.7	15.7	1.9	0.5	1.5	3.6-4.2	5.3

Figure 1. Suggested Base Vegetative and Fruiting recipes (mmol/L) for Nobility in Coir Substrate

Nutritional Guidelines for Floricane Only and Grow-Through Cropping (from Long Canes)

This section covers suggested nutrition guidelines for the new PSI varieties when cropped as long canes (either Floricane-only, or in Grow-through systems).

Recent trends in raspberry production are towards the single use of Floricane-only cold stored long canes and away from grow-through, as the latter is labour intensive, expensive, and becoming more difficult due to losses of particular plant protection products.

- Floricane crops from cold stored long cane require a more intensive feeding approach with more emphasis on Nitrogen in the vegetative phase compared to Primocane cropping, or long cane propagation (Nursery production).

It is important to plant into well buffered coir substrate. Starter and fruiting feed K/Ca ratios are the same as for Primocane cropping.

- Drip + drain EC and pH targets are similar to the Primocane cropping targets
- except that a slightly higher EC Sum may be beneficial during the vegetative phase (3.2-3.6 mS) in order to promote adequate leaf area development.
- Aim to give 5-15% runoff during dull/cloudy weather and 20-30% during sunny weather during both vegetative and fruiting phases.

Drip fertilizer recipes should be calculated according to substrate and background water supply. General guidelines on nutrient targets are given in the table below.

	NO ₃ -N	NH ₄ -N	P	K	Ca	Mg	S	Fe	Mn	Zn	B	Cu	Mo	EC feed (mS)	EC sum (mS)	pH
- Vegetative	12.5	1.8	1.3	3.4	3.7	1.8	1.2	35.8	18.2	7.7	13.0	1.9	0.5	1.7	3.0-3.6	5
- Fruiting	12.0	0.3	1.1	5.6	3.0	1.6	1.0	35.8	18.2	7.7	15.7	1.9	0.5	1.6	3.6-4.2	5

Figure 2. Suggested Base Vegetative (Starter) and Fruiting recipes (mmol/L) for Long Cane Ovation, Majestic and Paragon in Coir Substrate

Summary

Primocane cropping and Long Cane propagation

- Use a lower drip N recipe and more controlled water management (lower run off) in order to minimise cane overgrowth and disease incidence.
- Aim for Drip + Drain EC targets of 2.8-3.4 mS during the vegetative phase and 3.6-4.2mS during fruiting, for optimum cane growth and fruit size.
- Running the EC Sum too low may result in overly short canes, with short internodes, and weak, crowded laterals lacking flowers due to insufficient nutrients.
- Running the EC Sum too high during the vegetative phase may result canes with high disease incidence, excess branching, long internodes and a lack of usable buds.
- Too high EC sum during the fruiting phase results in reduced fruit size and yield.

Long Cane (Floricanes only) cropping and Grow-Through

- Start with a higher N recipe in order to establish sufficient leaf area before fruiting.
- Aim for a Drip + Drain EC target of 3.0-3.6 mS during the vegetative phase and 3.6-4.2mS during fruiting, for optimum cane growth and fruit size.
- Running the EC Sum too low may result in short, weak laterals, prone to breakage and insufficient leaf area due to a lack of nutrients, particularly Nitrogen.
- Running the EC Sum too high results in smaller fruit and reduced yield.
- It is important to give sufficient run off to control the build-up of EC.
- Vary % run off according to plant size and weather conditions.

In all Cases

- Aim for pH 5.3 at the dripper in order to prevent trace element deficiencies due to Fe/Mn lock-up in substrate.
- Nutrient demand varies with plant growth stage, crop load, light and temperature.
- The suggested Base Starter and Fruiting recipes given are guidelines only.
- It is recommended to send substrate, drip + drain, and/or leaf samples to a recognised laboratory for analysis every 2-4 weeks during the growing season. Fertilizer recipes can then be adjusted according to the results.