

# Controlled Release Fertilizers: Recent Nursery Trials in Sweden<sup>©</sup>

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## INTRODUCTION

The development of controlled release fertilizers (CRF) parallels the progress of container growing with most of the advances being made in the 1980s and 1990s. The first CRF sources to become commercially available were only nitrogen (N) but the technology has expanded to include potassium (K), phosphorus (P), and other nutrients, including micronutrients.

Controlled release fertilizers use several mechanisms to limit the amount of nutrient made available at any one time. In the first types, nutrient prills were coated with materials as molten sulphur, clay, and wax. The problem with these materials was that cracks in the coating meant the release-rate was not uniform. Today this problem has been overcome by using other materials. For example, Osmocote® uses a resin coating of an alkyd-type, while Multicote® and Plantacote® use a polyurethane-like coating and Ficote® uses thermoplastic resins. All these materials allow a controlled release of nutrients by osmosis, where the thickness of the coating determines release timing and rate.

Today CRF fertilisers are widely used in container production of nursery stock all over the western world and in Japan. Growers in Sweden started to use them in the early 1970s. At that time the only available product was Osmocote. Today we also use Multicote, Plantacote, Ficote and Basacote®.

## TRIAL 2013

A trial in 2013 was sponsored by Osmocote manufacturer Everris and the aim was to show the differences between “2<sup>nd</sup>” and “4<sup>th</sup>” generation Osmocote and some other current CRF products. The trial was located on a commercial nursery in south west Sweden, where the growing season is about 210 days. The crops were: *Cotoneaster dammeri* ‘Coral Beauty’ and *Spiraea japonica* ‘Little Princess’. Rooted cuttings were potted in 2-L containers with the grower’s standard peat-based mix — though the lime rate was reduced to 2 kg·m<sup>-3</sup> instead of 4 kg, because of the high concentration of calcium in the irrigation water.

The trial fertiliser treatments were: Osmocote Exact Hi.End 8-9M, in two rates; Osmocote Pro 8-9M; Multicote 8M, and Basacote Plus 8M. The rates for cotoneaster and spiraea are shown in Table 1. The fertilizers were applied into two drilled holes per pot.

Table 1. Fertiliser rates used in the trial.

Treatments	<i>Cotoneaster</i> rate (g·L <sup>-1</sup> )	<i>Spiraea</i> rate (g·L <sup>-1</sup> )	Label colour
Osmocote Exact Hi. End 8-9M (Rate 1)	3.5	4.5	Blue
Osmocote Exact Hi. End 8-9M (Rate 2)	4.5	5.5	Red
Osmocote Pro 16-4.8-10.8, 8-9M	3.5	4.5	Orange
Multicote 8M	3.5	4.5	White
Basacote Plus 8M	3.5	4.5	Rose

Note: g·L<sup>-1</sup>= kg·m<sup>-3</sup>.

Plants were potted and fertilised with CRF on May 20. At this date the cotoneasters had begun to grow, but not the spiraeas. The trial was assessed monthly during the growing-season. The final assessment was made on September 27. The weather during the growing-season was normal for the region Sweden, except for periods with exceptionally

warm and dry weather in July and August. September was also warm with temperatures above average.

## RESULTS

### Cotoneaster

Until the August assessment there were small differences in growth and colour between the treatments. After this date, however, plants with Multicote and Basacote were of slightly inferior quality. The final assessment showed that all plants, in all treatments had reached saleable size and quality, according to Swedish Standards. However, there were some differences in growth and colour.

The best growth was in the treatment with Osmocote Hi.End, Rate 2, closely followed by Osmocote Hi.End, Rate 1 and Osmocote Pro, then Multicote and Basacote. In general, all the Osmocote-treatments gave plants with a dense centre and more and longer shoots, compared with the other fertilisers.

Osmocote Hi.End, Rate 2 produced plants with the darkest foliage, while Osmocote Hi.End, Rate 1 and Osmocote Pro were somewhat lighter, but still darker than Multicote and Basacote (Table 2).

Table 2. Final quality assessment *Cotoneaster dammeri* ‘Coral Beauty’.

Treatment	Growth	Colour	Damaged plants
Osmocote Exact Hi. End (Rate 1)	4.5	4.5	0
Osmocote Exact Hi. End (Rate 2)	5.0	5.0	1
Osmocote Pro	4.5	4.5	1
Multicote	4.0	4.0	1
Basacote	4.0	4.0	0

### Spiraea

At the first assessment, 2 weeks after potting, all plants had begun growth. There was some variation in plant development, and a number of plants had grown less than others. This variation was more or less the same in all the treatments. By the final assessment all plants, in all treatments, had reached saleable size and quality, according to Swedish Standards.

The best growth was from the two treatments with Osmocote Hi. End, followed by Osmocote Pro and Multicote. The best colour was from Osmocote Hi. End, Rate 2 and Osmocote Pro. Slightly lighter were Osmocote Hi. End, Rate 1, while Multicote and Basacote were the lightest (Table 3).

Table 3. Final quality assessment *Spiraea japonica* ‘Little Princess’.

Treatment	Growth	Colour	Damaged plants
Osmocote Exact Hi. End (Rate 1)	5.0	4.5	0
Osmocote Exact Hi. End (Rate 2)	5.0	5.0	0
Osmocote Pro	4.5	5.0	0
Multicote	4.5	4.0	0
Basacote	4.0	4.0	0

## OBSERVATIONS ON THE USE OF CRF FERTILISERS IN SWEDEN

Today all Swedish nurseries growing containerized nursery stock use CRF. Growers of these crops in Sweden now rarely use liquid fertilizers nowadays. The most widely used brand at present is Multicote. This product has by tradition been significantly cheaper than, for example, Osmocote. Most crops in Sweden are grown for one season, which

means potting in April-May and saleable plants in late August or September. Growers in Sweden only use peat as growing media and the standard fertiliser and lime rates are ( $\text{kg}\cdot\text{m}^3$ ):

- 3 kg CRF, 8-10 month formulation
- 1 kg NPK 11-5-18 micro or PG-mix
- 2 kg Mg-lime
- 2 kg lime

For fertilization the 2<sup>nd</sup> year and beyond, Swedish growers use: NPK 11-5-18 micro, Osmocote Topdress or, in some cases, liquid fertilizers. There have been numerous trials in Sweden to compare different brands of fertilisers during the last 20 years. This includes various types of Osmocote, Multicote, Plantacote, Ficote, and Basacote. In the same trial we have always used products with equal release periods.

The conclusions of all these trials are that the differences between the various brands in terms of plant quality and colour are small, except for Basacote, which in general has given plants of inferior quality under Swedish conditions. In practice this has led most Swedish growers to chose CRF products by price rather than brand.