Prevention of berry set and true seed production in six potato (*Solanum tuberosum* L.) cultivars by single foliar applications of MCPA

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**Summary**

True potato seed production may contribute to the spread of several diseases and pests. MCPA (500 or 750 g a.i. ha\(^{-1}\)) applied at early or full bud stage reduced berry number and seed number per berry, resulting in reduced true seed production. Effects on berry set differed between cultivars and were dependent on crop growth stage at application and true seed production was reduced most strongly in all cultivars with application at full bud stage. MCPA also slightly reduced yield and tuber size, but did not affect tuber dry matter content or fry colour.

**Introduction**

Some potato cultivars are known to produce many berries containing large quantities of viable seeds which may remain viable in the soil for over 10 years (Lawson, 1983). Seedling volunteers are weeds that in some crops are difficult to control and frequently cause a substantial increase in herbicide use in subsequent crops. Moreover, they may multiply and spread potato cyst nematodes, viruses, fungi and bacteria (Lutman, 1977). Tubers produced by seedlings add to the problem of traditional groundkeepers and may give rise to rogue plants in seed potato crops (Lawson, 1986). Clearly, the production of seeds by commercial crops is undesirable for a number of reasons.

As long as true seed producing cultivars are commercially important and breeding programmes are not able to eliminate this characteristic there is need for agronomic measures to reduce true seed production.

Veerman & Van Loon (1993) showed that berry set can be greatly reduced by a foliar application of MCPA, but the effect depended on the morphological stage of the flowers at application. Largest reductions were found at early bud stage. We conducted our research with cv. Van Gogh only and the main parameter investigated was the number of berries produced. However, we also found an indication that MCPA reduced the number of seeds in the berries that were produced. Viability of the seed produced was not tested.

In this paper we report on continued research. Firstly we investigated whether cultivars respond differently to the timing and dosage of an MCPA application with...
regard to the reduction of berry set, tuber yield, tuber size and tuber quality. Secondly, we investigated whether the lower seed number per berry after MCPA application found by Veerman & Van Loon (1993) is consistent over cultivars and treatments. Thirdly we evaluated the effect of cultivar and MCPA treatments on the viability of the true seed produced.

Materials and methods

Experiments were conducted in 1994 and 1995 at the Research Station for Arable Farming and Field Production of Vegetables in Lelystad. The 1994 experiment contained cvs Asterix, Bildtstar, Disco, Elles, Saturna and Felsina and the 1995 experiment the cvs Asterix, Bildtstar, Disco and Elles.

In 1994 MCPA, (4-chloro-2-methylphenoxy)acetic acid, Single MCPA 500 g l⁻¹ (Na-K-dimethylamine-salt, Rhône Poulenc) was applied at 500 or 750 g a.i. ha⁻¹. In the 1995 experiment 500 g ha⁻¹ was applied. In both years the doses were applied in 600 l water ha⁻¹ at an application pressure of 3 bar.

In both years single applications were carried out at early bud stage when peduncles had not or had just started to elongate and at full bud stage when buds were swollen. Application dates in 1994 for early and full bud application were 23 and 27 June respectively for cvs Bildtstar, Elles and Saturna. For cvs Asterix, Disco and Felsina they were 30 June and 1 July respectively. In 1995 the dates for all cultivars were 23 June and 4 July for early and full bud applications, respectively. In both years non-sprayed controls were included and the experiments contained four replicates.

After desiccation berries from both plants and soil were collected and counted from an area of 2.25 m² per plot. Weight and number of seeds from a maximum 10 berries per plot were assessed. Seeds were stored at 5 °C. After weighing a sample of up to 100 seeds per plot, viability was assessed in August 1996 by placing the seeds on moist paper in Petri dishes at 20 °C. Seeds were considered viable when they had produced a full grown seedling with cotyledons. Seedlings were counted 3 times per week for thirty days. Data from the final countings are presented.

Tuber yield and size were determined. From the 1994 experiment samples were taken and stored at 6 °C. In January 1995 tuber dry matter was assessed by means of under-water weighing, and fry colour was determined using the USDA colour chart (Anon., 1972).

Results were analysed with the ANOVA procedure of Genstat 5 Release 3.2. (Genstat 5 Committee, 1993). LSD values were calculated at P<0.05. Seed numbers per m² were not normally distributed and therefore were submitted to a square root transformation.

Results

Berry production by controls was very low in 1994 but was considerably higher in 1995 in cvs Bildtstar, Disco and Elles.

Effects of MCPA on berry formation differed between cultivars. In Bildtstar and