SEED PRODUCTION IN HYBRID DAHLIA

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ABSTRACT

Seed grown dahlias lack uniformity of growth habit and are particularly erratic bloomers. This results in a wide range of seed maturities within a plant and creates major problems for seed harvest. In an attempt to reduce the spread of flowering and improve uniformity, crop manipulation by hand pinching and the application of three plant growth regulators was investigated in field grown dahlia (*Dahlia hybrida*) cvs. Unwins Dwarf Mixture and Figaro White.

In 1987/88 the effects of pinching above nodes 3, 4 and 5 on flowering pattern, flower production and seed yield of dahlia cv. Unwins Dwarf Mixture were determined. Pinching had no effect on the number of flowers per plant or total flowering period. However pinching did shorten the days from first to peak flowering because of increased uniformity of lateral branch growth. Pinching above node 4 increased harvested seed yield by 40 % and cleaned seed yield by 32 % but only the former result was significant. Although pinching above node 4 also produced more seedheads per plant and seeds per seedhead than in non-pinched plants, differences were once again non-significant.

In the following season (1988/89) two rates of three plant growth regulators (PGRs) were applied at two growth stages (i.e. paclobutrazol 0.5 and 1.0 kg a.i. ha^{-1}, daminozide 2.0 and 4.0 kg a.i. ha^{-1}, chlormequat chloride 1.5 and 3.0 kg a.i. ha^{-1} at visible terminal bud stage and stem elongation) to plants of two cultivars, Unwins Dwarf Mixture (multicolour, 70 cm tall) and Figaro White (white, 30-35 cm tall) to determine their effects on plant growth and development, flowering pattern, seed yield and yield components. Hand pinching above node 4 was also included as a treatment for comparison. In cv. Unwins Dwarf Mixture, hand pinching increased lateral branch length and promoted simultaneous flowering, but did not significantly increase seed yield or any of its components. All three PGR's retarded growth initially, but these effects mostly did not persist past first flowering. Flowering duration or flower numbers did not alter following PGR application, and so a high variation in seed maturation was still present in all plots. However two PGR treatments, paclobutrazol (1.0 kg a.i. ha^{-1}) applied at the first visible bud stage, and chlormequat chloride (1.5 kg a.i. ha^{-1}) applied at the

stem elongation stage significantly increased seed yield. The response to paclobutrazol came from an increased number of seeds per seedhead and greater uniformity of seedhead development, which reduced the seed loss during cleaning (from 44 to 11 %). The reason for the seed yield increase following chlormequat application was not clear, as yield components did not differ significantly, but more seedheads per plant were recorded. In the dwarf cultivar Figaro White, PGRs did not increase seed yield. Retardation effects were transitory. Seed yield of this cultivar was very low because of poor seed setting in all treatments and it is suggested that white petal colour is unattractive to insect pollinators.

Response to PGRs is application rate and time dependent. Results from the previous trial suggested that paclobutrazol application could be more effective if applied earlier, whereas for chlormequat chloride, later application (i.e. at or after stem elongation) may be more appropriate. However, paclobutrazol application at the vegetative stage did not affect seed yield, and as in the previous experiment, seed yield was increased following application at the visible bud stage only. Chlormequat chloride applied at stem elongation also increased harvested seed yield but not cleaned seed yield, presumably as a result of loss of immature/light seed.

Because of the diversity of seed maturation, optimum harvest time is difficult to judge in dahlia grown for seed. Reproductive growth and development were monitored in glasshouse grown plants of cv. Unwins Dwarf Mixture, and the sequence of seed development determined in flowers produced on plants growing from tubers left in the field from a previous trial. Seed yield was most strongly related to seedhead numbers rather than seed numbers or weight, and thus the uniformity of seedhead maturation is important for a high yield of quality seed. Although the total flowering period was over two months (from 66-132 days after sowing (DAS)), around 80 % of the total flowers produced were formed between 75-96 DAS. Each seedhead needed 33 days from first flower opening to reach seed physiological maturity, and seed could remain in the seedhead for a further 9 days before shedding began. Thus the optimum harvest time was between 33-42 days after first flowering (or 120-129 DAS) because during this time the maximum number of mature seedheads was recorded, seed had reached full viability, and seed shedding had not begun. Once seedheads opened, seed

moisture fell rapidly (from 40 to 14 % in 3 days) and seed was completely shed by 54 DAF.

Delaying harvest until 60 days after peak flowering (DAPF) produced the greatest harvested seed yield in untreated plants because of the continued ripening of green seedheads. However, after cleaning, seed yield at 60 DAPF did not differ from that at 42 DAPF because of greater cleaning losses (43 cf. 27 %). In addition, seed sprouting in the seedhead was observed by 54 DAPF. When harvested at 42 DAPF both paclobutrazol and chlormequat chloride significantly increased seed yield, but cleaning losses were high in chlormequat chloride treated plants. PGR's did not delay seed maturity, so that as seed harvest was delayed any PGR yield advantage tended to disappear. PGR treatments did not affect thousand seed weight or germination.

Chlormequat chloride applied at 1.5 kg a.i. ha^{-1} at the stem elongation stage increased secondary lateral branch production and hence the number of flower sites, while paclobutrazol applied at 1.0 kg a.i. ha^{-1} at the first visible bud stage increased flowers, seedheads and/or seeds per seedhead over that of control plants. However, dahlia plants did not appear to be capable of supporting the extra number of seeds through to maturation; cleaned seed yield was not always increased because light seed was cleaned out of the seed lot. For dahlia seed production it may be more effective to try and achieve increased inter-plant uniformity by growing at very high density, rather than trying to achieve this effect through chemical manipulation. This idea is briefly discussed.

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