SEED PRODUCTION STUDIES IN LUCERNE (*Medicago sativa* L.) cv. GRASSLANDS ORANGA

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ABSTRACT

Two years of field trials with lucerne (*Medicago sativa* L.), cv. Grasslands Oranga, were used to determine plant vegetative and reproductive responses to the effects of row spacing and sowing rate, application of two plant growth regulating chemicals, and weed control.

For an autumn (March 15) sowing, seedling number per metre of row increased as sowing rate (1 to 12 kg/ha) and row spacing (15 to 60 cm) increased. However the number of seedlings was not directly proportional to the number of seeds sown, and percentage establishment six months after sowing was highest (73%) at the lowest sowing rate of 1 kg/ha. Overall mean establishment for all treatments was 57, 46, and 34% for 1, 6, and 18 months after sowing respectively. Dry matter production at 6 months after sowing was greatest at the 15 and 30 cm row spacings and 12 kg/ha sowing rate, but there were no significant differences in dry matter among treatments at later assessments. In the first year seed yield from the 15 cm row spacing was significantly lower than from the 30, 45 and 60 cm row spacings, while sowing rate had no effect on seed yield. In the second year, row spacings did not significantly affect seed yield, but the seed yield from the 1.0 kg sowing rate was significantly increased because harvestable racemes/m^2 and thousand seed weight were significantly increased. Seed yield over the two years of the experiment was highest at the 1 kg/ha sowing rate and for the 30 and 45 cm row spacings. The average seed yield for all treatments was 127.2 and 186.9 kg/ha for the first and second year respectively. Neither row spacing nor sowing rate had any effect on the quality of harvested seed. There were no interactions between row spacing and sowing rate for plant establishment, dry matter production, or seed production.

In the 1991/1992 season, the effect of two plant growth regulators, paclobutrazol at 1.0 kg a.i/ha (applied on 1 November or 1 December), and cycocel at 3.0 kg a.i/ha (applied on 1 December, 23 December, 1991 or 1 January 1992), on vegetative and reproductive growth was examined. Paclobutrazol applied during active vegetative growth (1 November) significantly altered vegetative shoot development by inhibiting apical dominance, thus inducing lateral branches which subsequently increased

reproductive sites, and increased seed yield by 37%. This seed yield increase was due to an increased number of racemes/m^2 (+36%) and pods per raceme (+72%). Paclobutrazol applied at first flower bud appearance (1 December) had no effect on seed yield or seed yield components because it did not alter shoot production or the number of racemes. Cycocel application did not retard plant height or increase racemes per unit area. However while application on 23 December (at first flowering) had no significant effect on seed yield, cycocel applied in early December (first flower bud appearance) or early January (at peak flowering) significantly decreased seed yield, because of a reduction in the number of flowers/m^2 and/or harvestable racemes/m^2.

In the following season (1992/93), paclobutrazol at 0.5 kg a.i/ha and 1.0 kg a.i/ha was applied during active vegetative growth on 25 October 1992. Both rates significantly reduced plant height by 8 weeks after application, but this effect had disappeared by final harvest. As in the previous year, paclobutrazol at 1.0 kg a.i/ha significantly increased seed yield, but the increase (+153%) was much greater than in the previous year. This increase in seed yield was associated with an increase in the number of harvestable racemes/m^2 (+126%), pods per raceme (+36%) and thousand seed weight (+11%). Paclobutrazol at 0.5 kg a.i/ha had no significant effect on seed yield.

In 1992/1993 the effect of hand weeding and the application of three herbicides (hexazinone 1.0 kg a.i/ha, simazine 2.25 kg a.i/ha plus paraquat 0.6 kg a.i/ha) on seed yield in a second year crop was investigated. Hand removal of weeds, predominantly white clover but also *Poa annua* L. and broad leaved species increased seed yield from 0.7 to 21.3 g/m^2, mainly because racemes increased from 89 to 1230/m^2. Increases in pods per raceme and seeds per pod were also recorded. Hexazinone applied during active vegetative growth in early spring eliminated white clover from lucerne plots and increased seed yield to 14.3 g/m^2. However this treatment did not control *Rumex obtusifolius* L. Simazine plus paraquat applied in winter before active spring growth controlled many annual weeds but, although initially checking white clover, did not control it. As a consequence, seed yield did not differ from that of the untreated control. Although hexazinone effectively removed white clover from a second year lucerne seed crop, it is recommended for use only on mature stands. Harvested lucerne seed viability did not differ among treatments, but hand weeding and herbicide treatments significantly reduced the percentage of hard seed.

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