

The effect of sowing rate and sowing date on yield and yield components of *plantago ovata* (forsk.) in Northern Australia

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Plantago ovata is an herbaceous annual grown for its seed husk which has several pharmaceutical uses(1). The husk equivalent of 26,000 t of seed was imported into the U.S. in 1983-84(2). Virtually all of the world's production is at present grown in India(3). These trials were part of an ongoing programme to develop commercial production of the crop in northern Australia. These data suggest an optimum seeding rate of 8 kg ha⁻¹ and optimal sowing dates between early May and early June. Additionally they indicate several yield components can account for yield reductions.

Methods

Trials were sown in 1985 and 1986. Irrigation, fertilizers, weed control and general agronomy used best available information. Trials were randomized split plots on Ord sandy loam in 1985 and Cununurra clay in 1986. The 1985 trial had 3 reps with 4 sowing dates as main treatments and 2 sowing Methods. Each treatment covered 8 m². In 1986 the trial had 4 reps with 6 sowing dates as main treatments and 4 sowing rates. Each treatment covered 30 m². Phenological development was recorded and 1.5 m² and 0.75 m² yield samples were taken at harvest maturity in 1985 and 1986 respectively. A sub-sample of 5 plants was used to determine yield components.

Results and discussion

Figure 1 clearly indicates optimal sowing rates and dates. At high seeding rates reduced yields were due to lower harvest index (down from 15% to 11.5% $P < 0.001$), due to more non-productive heads (up from 9 to 14%, $P < 0.02$) and shorter heads (down by 8% $P < 0.005$). There were no significant changes in, heads ha⁻¹, mean seed weight, seeds floret⁻¹ or florets (mm of head)⁻¹. Yield reductions due to late sowing were produced by a different mechanism. Harvest index was constant, however total length of heads ha⁻¹ was greatly reduced. In 1985 this was primarily due to a 42% decline ($P < 0.001$) in mean individual head length. In 1986 this was primarily due to a 58% reduction ($P < 0.001$) in heads ha⁻¹. Seed size and number of seeds floret⁻¹ were reduced about equally in both years. This lead to fewer seeds (mm of head)⁻¹ which declined by 35% in 1985 and 30% in 1986 ($P < 0.001$).

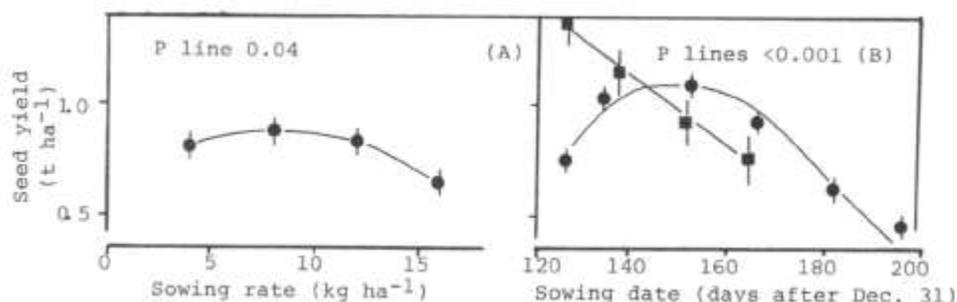


Figure 1 Relationship between *P. ovata* seed yield and sowing rate (A) and date (B) for 1986 (•) and 1985 (n).

1. Brydon, W.G., Boreys-Christensen, S., van der Linden, W., and Eastwood, M.A. (1979). J. Nut. Sci. 18, 77-80.

2. USDA (1985). Foreign Agricultural Trade of the United States. Fiscal Year 1984 Supplement. Washington D.C.

3. Gupta, R. (1982). In 'Cultivation and Utilization of Medicinal Plants' (Eds C.K. Atal and B.M. Kapar) pp. 406-417. Jammu Jawi, India. 523