

RATE OF DEVELOPMENT AND YIELD OF GROUP 2, 3 AND 4 MATURITY SOYBEAN CULTIVARS PLANTED AT THREE DATES

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ABSTRACT

A late November planting of the group 2 maturity cultivar, Amsoy is the current recommendation for obtaining maximum soybean yield in the Waikato. Earlier planting of later maturing cultivars maybe more productive through greater use of the available growing season. A comparison was made of group 2, 3 and 4 cultivars planted on October 17, November 3 and 26, 1975.

Group 3 and 4 cultivars flowered 14 and 21 days later and matured 13 and 32 days later on average, respectively, than the group 2 cultivar Amsoy. Group 4 cultivars matured too late for use in the Waikato but group 3 cultivars rated as full season, maturing prior to the latest acceptable date, from the mid October and early November plantings. Group 3 cultivars outyielded Amsoy at the mid October and early November plantings but at neither planting date was maximum yield (2720 kg/ha) significantly greater than for the late November planted Amsoy (2500 kg/ha). However the mid October planting of group 3 had the advantage of an earlier harvest date than late November planted Amsoy.

Cooler than average February temperatures reduced yields and delayed maturity. Further testing of group 3 cultivars is required.

INTRODUCTION

In the USA the highest yield of soybean in a locality is generally achieved by using a cultivar which most fully occupies the available growing season (Pendleton and Hartwig, 1973). Full season cultivars have the added advantage of being less sensitive to planting date in respect to yield than shorter season cultivars (Scott and Aldrich, 1970).

The current recommendation to obtain maximum soybean yield in the Waikato is to plant the group 2 maturity cultivar Amsoy in late November (McCormick 1974, 1975). Earlier planting of soybeans by some 4 to 6 weeks is possible and for Amsoy has the advantage of giving an earlier harvest date under more favourable weather conditions. However the practice results in reduced yield because of lower less favourable temperatures during the flowering and bean filling periods (McCormick 1975). Soybean cultivars of later maturity groups than Amsoy planted earlier would flower and mature at about the same time and through greater use of the available growing season could be more productive.

The yield of the group 3 maturity cultivar Wayne has shown less sensitivity to planting date than Amsoy in previous studies (McCormick, 1974, 1975) but maximum yield has been lower. However, from the American evidence there appeared good reason to test further group 3 and group 4 cultivars against group 2 Amsoy over a range of sowing dates.

EXPERIMENTAL METHOD

The trial was conducted on Horotiu Sandy Loam at the Rukuhia Research Station in the 1975-76 season. Soybean cultivars Amsoy (group 2), Wayne, SRF 300 and Calland (group 3) and Kent, Clark and

SRF 425 (group 4) were sown on October 17, November 3 and 26. Broadcast applications of 2500 kg/ha of lime and 625 kg/ha of 0-7-14 NPK fertiliser were made during cultivation. At planting inoculated soybeans were precision drilled in 60 cm rows at a rate of 40/m² with 100 kg/ha of 10-18-8 NPK starter fertiliser. A pre-emergence application of Linuron at 2.3 kg ai/ha and Alachlor at 2.2 kg ai/ha was made to control weeds.

A split plot, randomised block, design with 4 replicates was used with cultivars in sub plots of 6 rows, 8 m in length. Weekly assessments of development were made using the Fehr et al. (1971) classification system and after maturity bean moisture content was measured. Yield of clean beans at 12% moisture content was determined from 5 m of the two centre rows of the plots.

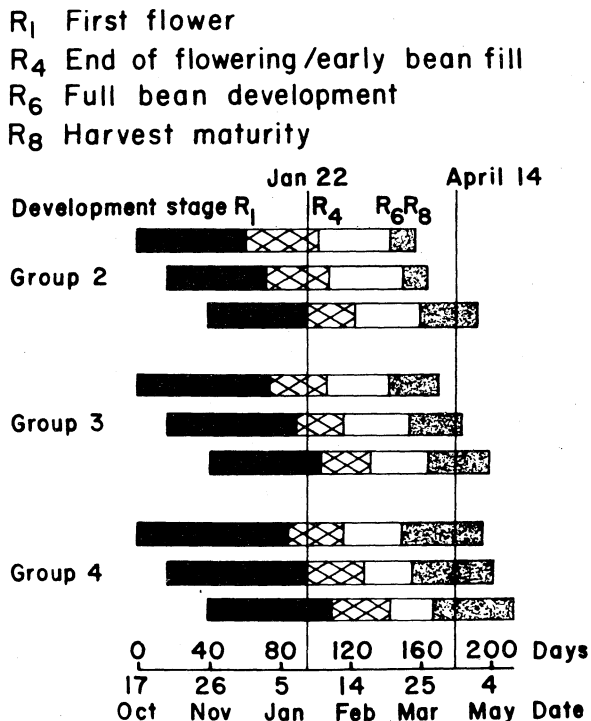
RESULTS AND DISCUSSION

Development

Cultivars in the same maturity group required a similar time to complete each development stage and responded to change in planting date in like manner. Consequently cultivar development with time was expressed as the mean for each maturity group (Fig. 1).

Flowering in group 3 and 4 cultivars commenced on average 14 and 21 days later respectively than in group 2 Amsoy and maturity dates were 13 and 32 days later. However delay in planting date hastened flowering and maturity in each group of cultivars with the effect being greater according to the increased maturity rating of the group. As a result maturity date was delayed less in group 4 than in group

FIG. 1 Development in relation to time for group 2,3, & 4 soybeans planted at three dates



2 cultivars by later planting.

Soybeans in the Waikato require a harvest date no later than April 14 and preferably earlier because of the deteriorating weather conditions at that time (McCormick, 1974). In this season late November planted Amsoy did not reach maturity until late April as a result of the cool seasonal temperatures, particularly in February (Table 1). It was estimated from planting date studies in previous years (McCormick, 1974, 1975) that this seasonal effect delayed

TABLE 1: Rukuhia mean monthly temperatures for 1975-76 growing season and difference from average.

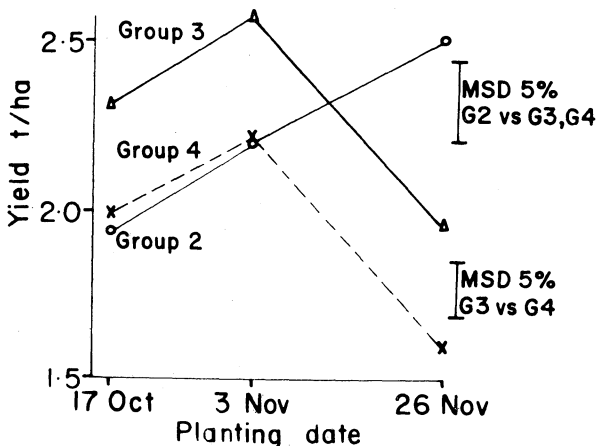
Month	Mean temp. °C	Diff. from average
Oct.	14.1	+0.9
Nov.	14.6	-0.2
Dec.	15.8	-0.9
Jan.	18.6	+0.6
Feb.	15.9	-2.5
Mar.	17.6	+0.6
Apr.	15.0	+0.6

maturity in Amsoy and Wayne by 3, 5 and 17 days for the three planting dates respectively. All plantings of group 4 cultivars matured later than April 14 and even allowing for a similar delay in maturity during this 1975-76 season, group 4 cultivars would mature too late for use in the Waikato. Group 3 cultivars however could be expected to mature by April 14 if planted no later than early November and rate as full season for the Waikato.

Yield

Maturity groups 3 and 4 responded similarly to planting date with yield increasing when planting was delayed until early November and declining at the late November planting (Fig. 2). In comparison

FIG. 2 Yield in relation to planting date and cultivar maturity group



group 2 Amsoy increased in yield with each delay in planting date. Though having a different pattern of response the yield of maturity groups 3 and 4 was as sensitive to planting date as the yield of group 2 Amsoy. The yield response of the maturity groups to planting date supports the interpretation made previously (McCormick 1975) that maximum cultivar yield is obtained when planting is scheduled so flowering commences in the third week of January (Fig. 1) and bean development takes place when seasonal temperatures are highest.

Individual group 3 and 4 cultivars outyielded group 2 Amsoy in the mid October planting (Wayne, SRF 300 and SRF 425) and again in the early November planting (Wayne and Calland) (Table 2). At neither planting date though were yields significantly greater than for the recommended late November planting of Amsoy. Early November plantings of group 3 cultivars, which can be expected to mature about the same time as late November planted Amsoy, must be higher in yield to be of advantage. However, mid October plantings need only to be equal in yield because maturity can be

expected at an earlier date.

TABLE 2: Bean yield (kg/ha at 12% moisture content) in relation to planting date and cultivar.

Cultivar (group)	Planting date			
	Oct 17	Nov 3	Nov 26	Mean
Amsoy (2)	1940	2200	2500	2210 ab AB
Wayne	2370	2720	1910	2330 a AB
SRF (3)	2410	2330	1730	2160 b AB
Galland	2160	2650	2250	2360 a A
Kent	2180	2040	1530	1920 c CD
Clark (4)	1460	2060	1640	1720 c C
SRF 425	2330	2330	1650	2100 b BC
Mean	2120 bB	2330 aA	1890 cC	

MSD 5%
for interaction = 290 (Significance of interaction 0.1%).
CV% = 9.5

The cultivars Amsoy and Wayne were lower in yield than in previous seasons as a result of the below average February temperatures (McCormick 1974, 1975). Soil moisture was not a limiting factor in this season. To what extent the pattern of yield response of the individual cultivars was affected by season is not known and further testing of group 3 cultivars under different seasonal temperatures is required.

CONCLUSIONS

Group 4 cultivars appear to mature too late for use in the Waikato but group 3 rate as full season cultivars.

Group 3 cultivars planted in mid October or early November are no more productive than the recommended late November planted group 2 Amsoy when grown under average to below average seasonal temperatures. However, a mid October planting has the advantage of an earlier maturity date and more reliable harvest conditions.

Further testing of group 3 cultivars under a range of seasonal conditions is required before any change in the current planting recommendation can be considered.

ACKNOWLEDGEMENTS

To Messrs R.H. Kidd, J.T.K. Poll and D. Thomsen for technical assistance in conducting the study and Mr C. Dyson for biometrical analysis.

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