

## Strategies and tactics with short fallowing

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In tillage experiments in southern NSW the comparison of short fallowing (SF) with no fallow (NoF) has revealed some years in which the seedbed and total available soil moisture (ASW) at sowing were better with SF (e.g. 1). It seemed both feasible and necessary to seek a more precise answer on this question by soil water modelling using a long run of historic weather data.

### Methods

A detailed model, partly based on SIMTAG (2), was developed to predict moisture under SF and NoF, the latter requiring a weed growth subroutine. The model was thoroughly validated against the tillage experiments.

### Results and discussion

The results for three fallow strategies over 41 years are summarized in Table 1. The values for NoF were quite insensitive to assumed starting weed LAI (range 0.001 to 0.025) and grazing pressure (0 to 40 sheep/ha):

**Table 1. Simulated average effects of fallow strategy for red brown earth at Wagga Wagga over the period 1943 to 1983 for wheat following wheat.**

Short fallow strategy	Available soil moisture May 1 (mm)	Probability a day in May <sup>b</sup> OK for sowing <sup>b</sup>	Median sowing date <sup>a</sup>
SF. Initiate when weeds first appear after harvest	62	75%	14 May
SF (late). Initiate when weeds appear after Feb.15	53	75%	14 May
NoF. No weed control	35	56%	21 May

a. Assuming sowing can begin on May 1 and requires 15 sowing days for completion. b. Soil moisture content (0-20 cm) between 0.15 and 0.25 cm<sup>3</sup>/cm<sup>3</sup>.

We also examined possible opportunistic fallowing tactics whereby fallow would only be initiated in years when advantages seemed worthwhile. Making realistic assumptions about the cost of fallow tillage, and the benefits of extra stored water and of a sowing date advantage Table 2 was prepared.

**Table 2. Simulated advantages of several short fallow strategies and tactics over no fallow; period 1943-83, Wagga Wagga, for wheat after wheat.**

Conditions for short fallow initiation	Years with fallow	Avg.extra ASW May 1 (mm)	Years with sow date advantage	Cumulative net benefit (kg wheat/ha)
SF	39(33) <sup>b</sup>	28	11	6010
SF(late)	39	19	11	4760
A.On Feb.15 if weeds present	22	29	8	5480
B.On Feb.15 if ASW > 50 mm	5	64	3	3550
C1.After harvest if ASW > 50 mm	25(13) <sup>b</sup>	35	5	6420
C2.E1 + A	29(13) <sup>b</sup>	33	8	7120
D1.After Feb.15 if ASW > 50 mm	20	29	4	4400
D2.D1 + A	29	23	8	4760

**b.** Years when fallow began before Feb.15.

Only tactics C1 and C2 were better than the SF strategy: both avoided following in many of the years when moisture advantages did not cover cultivation costs. Overall it is clear NoF carries a substantial cost in terms of moisture.

1. Mason, I .M. and Fischer, R . A . 1986. *Aust. J. Exp. Agric.* 26, 457-68.

1. Stapper, M. 1984. Ph . D. Thesis, Uni. of New England.