

# Stubble, Tillage and Ryegrass

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## Overview:

The combination of stubble burning and post-emergent use of a Group A herbicide has effectively controlled ryegrass in plots continuously cropped for 21 years at Condobolin. This combination worked well in both cultivated and direct drilled systems.

Poor ryegrass control was obtained where stubble retention was combined with cultivation (disc or tine), despite the use of post-emergent herbicides and occasional use of trifluralin. No-till plots had ryegrass densities about 25-30% of the stubble retained cultivated plots, but higher than where stubble was burnt.

Ryegrass densities with stubble retention were lower in pea-wheat than continuous wheat as higher rates of trifluralin and alternate grass herbicides could be used.

Stubble burning prevented the development of a herbicide resistant population of ryegrass in this experiment despite repeated use of a Group A herbicide.

## Background

Farmers in western NSW have traditionally grown pastures in rotation with cereals with the aims of maintaining soil fertility and diversifying farm income. An added benefit has been the control of grass weeds such as ryegrass by long fallowing or pasture topping. The decline in the profitability of livestock enterprises is leading to an intensification of cropping, increased reliance on herbicides and greater likelihood of herbicide resistance.

A range of management practices including heavy grazing, burning, an autumn 'tickle' to encourage germination, delayed sowing, competitive crops, crop topping and weed seed capture at harvest have been suggested as ways of managing ryegrass in continuous cropping. However, there are few long term studies describing the efficacy of these practices.

A long term trial at Condobolin in western NSW measured ryegrass populations under continuous cropping with a range of stubble and tillage practices.

## Methods

Five treatments using continuous wheat were imposed on a stubble paddock following a cereal crop in 1978;

- 1) BDD, stubble burnt, direct drilled
- 2) BC, stubble burnt, cultivated with a scarifier
- 3) INC, stubble incorporated by an offset disc, cultivated with a scarifier
- 4) RC, stubble retained, cultivated with a chisel plough fitted with sweeps
- 5) RDD, stubble retained, direct drilled

A further three treatments were in a pea-wheat rotation using BDD, RC or RDD except that pea residues were not burnt.

Weeds were controlled between December and February by knock-down herbicides and

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stubble and tillage treatments applied in March, depending on rainfall. The plots were initially grazed after harvest but this was discontinued in 1990 to ensure treatment effects on weed numbers could be observed. A Group A herbicide was applied post-emergent to all plots in most years, with at least 11 applications by 1999. Group D

herbicides were applied pre-sowing in 1996 and 1998.

## Results

Ryegrass densities (plants/m<sup>2</sup>) for continuous wheat are shown below. The comment column indicates whether the counts were before or after in-crop herbicide application.

Date	Burnt cultivated	Burnt direct drilled	In-corporated	Retained cultivated	Retained direct drilled	Comment
Aug 1993	1	0	6	10	2	post herb
May 1995	4	1	104	190	33	pre sow
July 1995	1	0	36	85	5	no herb
Aug 1996	1	1	189	204	13	pre herb
July 1997	1	2	141	195	34	pre herb
Aug 1998	0	1	213	240	60	pre herb
Oct 1998	0	0	41	28	15	post herb
July 1999	8	2	293	396	241	pre herb

Prior to 1993, ryegrass densities were generally low and controlled by post-emergent herbicides. In 1993 after herbicide application, small treatment differences were evident with almost none in the burnt plots, few in the no-till treatment and highest numbers in the retained cultivated treatments. This pattern was repeated at all subsequent dates, although absolute numbers increased in all but the burnt plots:

In the pea-wheat rotation, there was almost no ryegrass in the BDD treatment. Densities

for the RC and RDD plots were only about 20-30% of those in the corresponding continuous wheat plots, presumably because higher rates of trifluralin and an alternate grass herbicide (Sethoxydim) were used on peas.

These results show the value of combining management tactics such as stubble burning and broadleaf crops with the use of selective herbicides for the control of annual ryegrass in a continuous cropping system.