Department of Primary Industries
Department of Regional NSW

NSW research results

RESEARCH & DEVELOPMENT – INDEPENDENT RESEARCH FOR INDUSTRY

The following paper is from an edition of the Northern or Southern New South Wales research results book.

Published annually since 2012, these books contain a collection of papers that provide an insight into selected research and development activities undertaken by NSW DPI in northern and southern NSW.

Not all papers will be accessible to readers with limited vision.
For help, please contact: Carey Martin at carey.martin@dpi.nsw.gov.au

Published by NSW Department of Primary Industries,
a part of the Department of Regional New South Wales.

Investigating the current herbicide resistance status of problem weeds in northern cotton farming systems

Eric Koetz and Dr Asad Asaduzzaman (NSW DPI, Wagga Wagga)

Key findings

- Understanding key drivers and processes in controlling awnless barnyard grass (*Echinochloa colona*), feathertop Rhodes grass (*Chloris virgata*), fleabane (*Conzya bonariensis* L), windmill grass (*Chloris truncata*) and sowthistle (*Sonchus oleraceus* L).
- Investigating the impact on weed control of pupae busting and the potential impact of removing this tillage operation.
- Demonstration of integrated weed management principles, including controlling 'escape' weeds and the impact on seed set, to encourage industry to adopt the research outputs.
- Glyphosate resistance is emerging in cotton farming systems.

Introduction

This project addresses the rapidly escalating issue of herbicide resistant weeds in the cotton farming system. It aims to increase the research capacity within NSW DPI and the cotton industry, building on current and previous years of weeds research supported by NSW DPI, Cotton Research and Development Corporation (CRDC), Grains Research and Development Corporation (GRDC) and other research projects. This research will provide new information to cotton growers in support of MyBMP, expanding knowledge and information in WEEDpak, the *Guide to integrated weed management in cotton*, as well as scientific and other industry publications.

Weeds are a significant threat to all farming systems in northern NSW. The Australian cotton industry has rapidly adopted glyphosate-tolerant cotton since its introduction 13 years ago, and it currently accounts for the majority of sown crops. Accordingly, weed management practices have changed, with growers moving from applying residual herbicides in anticipation of a weed problem, to resolving weed issues with glyphosate in combination with other chemical or cultural methods for weed control.

These changes have resulted in a shift in the weed species found across cotton growing regions. Increasingly the broadleaf weeds flax leaf fleabane and sowthistle dominate weed spectrums in cotton crops, with increasing weed burdens in the non-cotton component of the rotation. Other important weeds include the emerging threat of awnless barnyard grass and increasing problems with feathertop Rhodes grass and windmill grass.

Methodology

A combination of surveys, field and glasshouse experiments, laboratory studies and observations in commercial cotton fields will be conducted during the term of the project.

The controlled environment experiments will be conducted at the Wagga Wagga Agricultural Institute. Glasshouses and growth cabinets will be used to impose a range of treatments. Treatments will be applied at various weed growth stages under different regimes including temperature, rainfall/soil moisture and herbicides. Different populations of awnless barnyard grass have been collected (Figure 1) and molecular studies conducted. These populations and seed collected from observed 'escapes' in the survey might also be used in the controlled environment studies.

The experiments will be conducted using standard randomised complete block or factorial designs with a minimum of four replicates. The field experiment to be conducted at the Australian Cotton Research Institute (ACRI) will also be replicated with plots of at least 50 m by 8 rows to allow for weed patchiness, a typical issue with weed experiments. The selected field at ACRI has a high background level of weeds and will be brought back into production to allow this research to be undertaken. A Roundup Ready Flex cotton variety will be planted in the field to allow these weeds to be managed during the season. A combination of tillage, pre, post and residual herbicides will be compared across growing seasons to examine the effects on weed species when pupae busting is removed from the program.

Figure 1. Weed survey 2016–17.

Summary

The expansion of the cotton industry in southern NSW has provided an opportunity for capacity building within NSW DPI in weeds research. A coordinated weed survey of problem weeds in conjunction with CottonInfo staff has collected a range of weed species from northern and southern cotton valleys. These weeds will be screened for resistance to glyphosate and, in addition, the grass weeds will be screened for herbicide resistance to Group A herbicides.

Initial results from 144 fields sampled in the 2014–15 season indicate resistance to glyphosate in 20% of sowthistle, 90% of fleabane, >80% of windmill grass and 20% of feathertop Rhodes grass samples. Final preparations are underway for the awnless barnyard grass screening. These results will be combined with the 2016–17 season survey to compile a benchmark for the industry for herbicide resistance in the major weed species in cotton farming systems. The 2016–17 surveys were focused on emerging weed issues as well as the above species.

Acknowledgements

'Hard to control weeds in the northern cotton farming systems', DAN1402, 2013–18, is a project with joint investment by the CRDC and NSW DPI.

The authors acknowledge technical support by Tim Grant, Technical Assistant ACRI, Narrabri and the CottonInfo Regional Extension Officers.