



An Economic Analysis of GRDC Investment in the Harrington Seed Destructor to Target Weed Seeds (Executive Summary)



GRDC Impact Assessment Report Series:

Title: **An Economic Analysis of GRDC Investment in the
Harrington Seed Destructor to Target Weed Seeds – Executive Summary**

September 2010

GRDC Project Code: ATR00008

This report was commissioned and published by the GRDC.

Enquiries should be addressed to:

Mr Vincent Fernandes

Corporate Strategy & Impact Assessment

Grains Research and Development Corporation

PO Box 5367

KINGSTON ACT 2604

Phone: 02 6166 4500

Email: v.fernandes@grdc.com.au

Author:

Agtrans Research

PO Box 385

TOOWONG QLD 4066

Phone: 07 3870 4047

Email: info@agtrans.com.au

ISBN No. 978-1-92177902501

GRDC

**Grains
Research &
Development
Corporation**

© 2011 Grains Research and Development Corporation.

All rights reserved.

Disclaimer

Any recommendations, suggestions or opinions contained in this publication do not necessarily represent the policy or views of the Grains Research and Development Corporation. No person should act on the basis of the contents of this publication without first obtaining specific, independent professional advice.

The Grains Research and Development Corporation will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this publication.

Executive Summary

In the late 1990s, Ray Harrington, a Western Australian crop producer, started experimenting with an innovative seed removal and destruction device that did not require removal of the chaff and weed seeds from the field. This innovation was later called the Harrington Seed Destructor (HSD).

The HSD has been improved through input from Western Australian Herbicide Resistance Initiative (WAHRI), a joint venture between the University of Western Australia and GRDC. These inputs assisted in refining the design and demonstrating its credibility for further development through in-field testing in commercial crops during the 2007 and 2008 grain harvests.

A plan for further development towards commercialisation was agreed in 2008 in discussions between GRDC personnel (Paul Meibusch) and Ray Harrington. A series of projects aimed at further developing the HSD were subsequently funded by GRDC. This investment is ongoing. Significant progress towards the commercialisation of the machine has been achieved to date. The following analysis describes the investment made from 2008 to date, the achievements realised and the potential benefits likely if and when the HSD is commercialised.

Many cropping farmers are undertaking activities to delay or manage the onset of on-farm herbicide resistance. Physical destruction methods include chaff carts towed behind the header (with subsequent burning of the chaff containing the weed seeds), bailing residues including seeds, and burning narrow windrows of chaff and straw. Such methods have all been used to varying degrees, but a number of factors have deterred their widespread use. For chaff carts these include the additional time required in transport of the residue off the paddock, burning the piles with associated smoke and fire hazards, removing the valued organic matter from the soil, machinery breakdowns, and the overall efficacy in reducing seed populations.

Some of the principal benefits that could be generated by the HSD are:

- Reduced chemical use in weed control and avoiding the need for continued development of new chemical product to combat resistance
- Avoidance of some sub-optimal rotational constraints for weed control
- An increased return of organic matter to the soil when compared with other physical removal methods that involve burning

The investment analysis carried out was prospective in nature as it required assumptions about the capital and operating costs of the HSD as well as the benefits to the individual cropping farmer that it could generate. Moreover, there was a need to make assumptions about the number of machines that would be purchased once it was commercialised.

Based on the assumptions made, the investment by the individual cropping farmer was shown to provide a positive benefit cost ratio of 2.6 to 1. The internal rate of return was over 26% per annum.

Based on this finding a realistic but conservative adoption level of 100 HSD over 10 years was assumed in order to estimate the wider industry benefits and hence the return to the total R&D investment in pre-commercialisation of the HSD. Based on all assumptions made, the total project investment of approximately \$2.6 million (present value in 09/10 \$ terms) has been estimated to produce an expected net

present value of \$25.6 million, a benefit-cost ratio of 11 to 1, and an internal rate of return of 17%. These investment criteria are expressed in 09/10 \$ terms over a benefit period of 30 years from the year of last investment and a discount rate of 5%).

An overview of benefits is provided in the following table.

| |
|---|
| <p><u>Industry Productivity and Profitability</u></p> <ul style="list-style-type: none"> • Reduced number of applications of chemicals in weed control and hence reduced cost of existing chemicals. • Avoidance of future requirements for new chemicals so reducing future weed control costs as chemical costs increase in real terms. • Avoidance of some sub-optimal rotational constraints for weed control (e.g. grazing, haymaking, other crops) and hence higher farm profitability. • Higher level of organic matter build up in soils so enhancing crop yields, soil health (biodiversity), nutrient availability and moisture retention capacity compared with other forms of seed removal and destruction. • Potential higher yields from reduced weed competition. • Potentially more robust cropping systems able to cope with climatic changes. • Potentially higher market returns for grain that is produced under best management practices in relation to the environment. • Potential export of HSDs (or royalty income) from sales to overseas crop producers. |
| <p><u>Environmental</u></p> <ul style="list-style-type: none"> • Reduced level of chemical usage for weed control and less chemical exports off farm. • Reduced air pollution from reduced chaff/straw burning when other forms of seed removal are used. • Enhanced soil biological activity and higher soil biodiversity. • Potentially reduced losses of native vegetation from fires. |
| <p><u>Social</u></p> <ul style="list-style-type: none"> • Reduced impact of smoke from burning chaff/straw on air quality in cropping regions. • Reduced likelihood of chemicals entering the external environment due to reduced use of chemicals on farm. • Maintaining the long-term viability of cereal farming and the maintenance of rural communities. • Reduced occupational health and safety risks from use of fire. |