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Summary Final Report - Trial 9: Reducing contamination of farm crop cover plastic film waste

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Executive Summary

Introduction	Contamination of plastic film, when it is recovered from field crops, is a serious constraint to this waste material entering into the recycling industry. The soil and plant matter is unavoidably adhered to the plastic film surface when lifted off crop, and often the levels of contamination make the material totally unattractive to the waste recycling industry.
Purpose of Project	This project investigates the development of a tractor attachment that can be used in the field, designed to clean surface contamination from the film, and to leave this material deposited in the field as the plastic is lifted. This field work in this project is focused only on the black film that is used in carrot production, which is laid on the crop over the winter period. The plastic film is laid on the row of carrots as an insulation layer to protect from weather and frost, and is supplementary to a covering of straw, which is laid over the plastic to provide the main insulation layer.
Prototype	The machine was designed and built by a specialist machinery manufacturer, Jones Engineering, who are one of the market leaders in the supply of specialist equipment to this sector of the industry. The machine featured a contra rotating brush on a tractor front linkage frame designed to clean both sides of the film as it is lifted from the crop and recovered onto a spool winding machine mounted on the rear linkage of the tractor.
The Trial	<p>The machine was operated in one crop of carrots in Nottinghamshire in April, and the plastic film was recovered from the field using first a standard spool recovery machine, and compared using a standard spool recovery machine with the brush cleaner. The results from this work were inconclusive. The prototype encountered operational difficulties achieving an even feed of the plastic film through the brush cleaner, and intermittent operation due to the film breaking as it was recovered.</p> <p>The machine has since been operated in other crops to recover other forms of crop cover film. The machine has been reported working satisfactorily working with clear plastic lifted from early crops of vegetables, but operation in other crops was beyond the scope of this specific project.</p>

Key Conclusions:

- The cleaning effect of the prototype is inconclusive at this stage of development.
- There is potential for both environmental and cost benefit from cleaning crop cover film at source in the field, which will leave contamination at source, and reduce collection costs.
- The carrot industry supports the principle of a field cleaning solution to reduce collection costs and develop recycling for plastic.
- Any solution must feature similar work rates to existing crop cover lifting methods, as harvest rate is priority to growers.
- The current prototype has been reported with good results operating in other crop cover plastic (outside the scope of this project). However for successful operation in wintered plastic, further development is needed.
- Areas of priority for developing the prototype are ease of operation for non skilled operator, and matching the severity of cleaning with strength of plastic film.
- The present crop cover film for winter carrots is made to a price, and is of low and variable quality. Successful machine cleaning of film will be a combination of improved machine operation, and improved film quality.
- Landfill disposal will become more difficult as a local disposal solution, as the rules governing material acceptance to landfill tighten, and as landfill tax and gate fees inevitably increase the cost of this option.
- The cleaning of crop cover has a cost, mainly of machine depreciation and maintenance as it will be attached to an existing machine. A budget cost is £16.50/ha has been estimated. The machine would need a high annual usage and so would be owned by a group of growers, or by a collector.
- The budget cost of cleaning crop cover in the field is estimated at £16.50/ha, or £30.40/t.

Recommendations:

- To develop the machine to simplify operator controls
- To develop the brush mechanism to be more sensitive to the crop cover film
- To work with the film producers to develop film that is compatible with the cleaning mechanism
- To develop the cleaning mechanism to be used in a range of crop situations.

Appendix. Images of the crop cleaning prototype machine

Image 1. Jones prototype reel and brush machine for carrot crop cover plastic recovery.



Image 2. Jones AWP reel and brush on the carrot trial April 2007

