

ABSTRACT

This research project sponsored by the Centre for Agricultural Technology(CAT) is seen as assistance to the Agricultural and Beef Industries which are among the major contributing industries to the Australian economy. The project involves a study of the grass seed industry in Central Queensland by conducting a market survey to determine the existing mechanisation in the seed industry and the problems faced by this group of farmers. The main aim of the study was to arrive at a design of an improved and more effective novel grass seed harvester, specifically designed by considering all the characteristics unique to grass seeds and the details which earlier research had indicated would help to increase the quality and the total yield, from the current 40-60% to about 80-95%. Earlier research on an air-assisted brush type of harvester indicated the problem of having to draw the seeds through the fan before separation. This seemed to cause trauma to the seeds which revoked the seed germination capacity. This research work has therefore been focused on designing a seed separator to be located ahead of the fan which could successfully separate the seeds of various shapes and sizes, from the large volume of conveying air required for suction, before entering the fan. A curved duct concentrator and a uniflow cyclone were selected as part of the experimental work and a theoretical approach was developed to understand and define the problems unique to the separation of the grass seeds. The results of these experiments and their comparison with the previous existing separators and harvesters have been discussed in this thesis. The technique for fan design for the harvester and finally the design specifications of a self driven harvester and a tractor mounted harvester were developed by incorporating all the harvester units, i.e the header unit, the separator and the fan.

**DEVELOPMENT OF A NOVEL HARVESTER FOR GRASS
SEEDS AND CEREAL CROPS**

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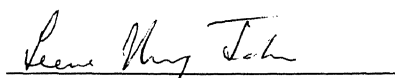
DECLARATION

This thesis covers the development and sets a specification for a Novel Vacuum Harvester for pasture seeds. The main area concentrated upon and developed is the air-solid separator unit of this harvester. The development of such a harvester would be of invaluable contribution specifically to the Pasture seed industry and the Beef industry and to the Australian Agricultural industry at large as 50% of its total income is from the pasture seed industry both directly by sale of quality seeds and indirectly by pasture improvement to the beef industry. If the separators designed prove to be only 50% as successful, as indicated in the laboratory experiments, it would help in solving many of the problems presently experienced by farmers in economising the harvester costs, eliminating considerable time lost in post harvest treatments and in stabilising the pasture seed industry.

This new harvester has been designed for a project supported by the Central Queensland University, C.A.T and D.P.I. It has been developed by taking into consideration the various problems faced by the farmers, seed merchants and consumers, to demonstrate the efficiency of this new harvester. Once the efficiency, easy operation and maintenance free parts of this harvester are fully established, it is believed that this harvester will become more popular and widely used in the pasture seed industry.

The work contained in this thesis is a direct result of the experiments carried out by the author and has not been previously submitted for a degree or diploma at any

other tertiary institution to the best of my knowledge. This thesis contains no material previously published by another person except where due reference is made.

A handwritten signature in cursive script, reading "Leena Mary John", positioned above a horizontal line.

Leena Mary John