DAN59

RESEARCH PROGRAM REPORT

FOR

NEW ANHYDROUS AMMONIA

DISTRIBUTOR

1989-1996

Anhydrous ammonia distribution : laboratory and field verification experiments

Background

In answer to a request in 1989 by the (then) Regional Director of Research, Trangie, for engineering research project ideas, the Australian Cotton Growers Research Association nominated a major problem of "striping" and the resultant lost production in cotton crops. "Striping" is manifested as a growth disorder/discolouration within cotton rows.

"Striping" was thought to be caused by either or both of the following two factors :

(i) soil compaction (or other damage)
(ii) poor anhydrous ammonia metering and/or distribution and/or application to the soil.

"Striping" due to compaction was seen to be very regular in the field (ie. confined mainly to the central trafficked rows of each pass) and as such was easily detected and separated from "striping" due to (ii), which was seen to be more widely distributed across each pass and more irregular within passes and fields. Whilst the attributed causes of "striping" are many, the major problem highlighted for initial engineering research input was the distribution of anhydrous ammonia (NH_3) in the field.

Discussions with local cotton growers and with Incitec (the sole manufacturers of NH_3 in Australia) continued to support the belief that anhydrous metering and distribution equipment was inaccurate (up to 30% too high at high rates of application had been reported on a number of occasions on recently calibrated meters). Clear evidence was also visible of "striping", particularly in the Macquarie Valley, NSW. Unfortunately, attempts by the parent companies (eg. John Blue and Continental) in the USA to overcome these problems have not been successful.

The ultimate goal for the Agricultural Engineering Research Unit, based at Trangie ARC, was to ensure an adequate but not excessive supply of anhydrous ammonia (NH3) to the crop in conditions which allow full utilisation by the crop. By so doing, this would either reduce or eliminate the presence of "striping" in cotton. To achieve this, a research program was initiated in 1989, with the specific aim to :

(i) determine the level and cause of variability in NH_3 flow and distribution from the outlets of rigs, and
(ii) modify the NH_3 application systems to ensure even flow and distribution.