NZAEI NEWS

NO. 16 *An informal account of current activities of the New Zealand Agricultural Engineering Institute* APRIL 1980

ETHANOL FROM CROPS

Small Ethanol Plant

A member of the Liquid Fuels Trust Board called to discuss the small pilot plant. A decision from the Board will be needed before funds are committed to the plant. There appears to be general agreement that Lincoln is the logical site.

Fermentation Studies

Work with the continuous tower fermmenter ceased in December when the stored beet reached the end of its useful life.

It has been found that sugar losses became significant after about two months of the kind of storage used, and that products of degradation in the beet had a serious effect on the rate of fermentation.

Agronomic Trials

After a patchy emergence the 13 hectares of beet on the College farm have produced good growth. A yellowing of the older leaves has been diagnosed as Sugar Beet Virus Yellow, but yield sampling indicates that results look promising.

Harvesting Equipment

Peter Steele has been on a study tour of beet harvesting regions. During his tour he arranged the purchase of large beet harvesting machinery. The harvester has already been landed and other items are on the way.

Alternative Fuels

A PTO dynamometer has been purchased for conducting engine tests with alternative fuels, and a mobile test bed has been constructed.

The petrol/ethanol tractor is being converted to CNG/biogas as a complement to M.A.F. research in biogas production.

TUSSOCK AND HILL COUNTRY OVERSOWING

In some high country areas difficulty is experienced in introducing more productive grasses, mainly due to the mat of roots already present.

Since 1977 the N.Z.A.E.I. has been conducting trials at five sites in the South Island. In this season's trials the project was expanded to include a commercially made tine drill, a disc drill, and a roto-drill made at the Institute.

The roto-drill, is a modified rotary cultivator which cuts slots in the ground. Seed and fertilizer are fed into the slots directly behind the rotor blades.

Due to the wet summer, there has been exceptional growth, and at all trial sites, the areas sown by the roto-drill have consistently given the best results.

Two areas sown in 1977 and 1978 had practically no rain for four months after seeding. These areas have shown a remarkable recovery and are looking very good.

ENVIRONMENTAL CONTROL

Poultry house ventilation controllers at present available in New Zealand for automatically opening and shutting vents, are essentially on-off devices which allow too much variation in temperature.

The environmental controller developed at the N.Z.A.E.I. and installed in a large commercial poultry shed has yielded very promising results.

During a six week test period the shed temperature did not vary by more than $1^{o}C$ from the $23^{o}C$ setting, except on one occasion when the day temperature rose higher than the shed cooling system could control.

IRRIGATION

Novel Approach to a Major Irrigation Scheme Investigation

The proposed Waireka-Kakanui and Marewhenua Downs irrigation schemes in North Otago will involve some unusual problems of on-farm storage and irrigation systems. Methods of collecting information in the field and follow-on engineering and economic design work related to these problems where recently studied in the field by a group from Ministry of Works and Development, the Ministry of Agriculture and Fisheries, and the N.Z.A.E.I.

The use of an inter-disciplinary team approach from the early stages of scheme investigation has been talked about in recent years, and M.W.D. is to be congratulated on taking the initiative here.

From 11th to 14th February, Terry Heiler, Peter Carran and David Lees joined the group, and a total of six farms were visited and appraised.

The exercise finished with a discussion of the findings and it was agreed that a number of aspects warranted further work by the M.W.D.

Climatic data for the area is being used in the computer model developed by Terry Heiler to assess the long term water requirement and crop yields as part of the same study.

STOCK SCALES

A local scale manufacturer has built a weighing platform using load cells and a commercially available readout unit.

Initial tests at Lincoln College using beef cattle were unsatisfactory due to large fluctuations in indicated weight resulting from animal movement and inadequate scale damping. A simple averaging circuit was added to the original electronics which improved the results considerably but not to our complete satisfaction

Work is proceeding on a microprocessor based system which will damp out stock movement and provide an accurate stationary display.

Provision is also being made to allow the use of animal identification numbers, and to have the results printed.

TRACTOR SAFETY FRAME TESTING

During the November/March period eleven safety frame tests were carried out at the N.Z.A.E.I. testing station at Lincoln. Only four of these were passed and approved.

This period saw the introduction of the O.E.C.D. test code, and five of the tests were done to this procedure.

Some time ago the N.Z.A.E.I. recommended to the Standards Association of New Zealand and the Department of Labour that consideration be given to adopting, as an optional test procedure, either the O.E.C.D. or the I.S.O. standard code for the testing of safety frames for agricultural tractors.

At present, Graham Garden is overseas to discuss the operation of these codes with European authorities, and to become familiar with the associated testing procedures and facilities demanded by the codes. He has attended meetings of the relevant I.S.O. and O.E.C.D. committees, and will visit safety frame testing facilitites in Great Britain, France, Italy, Germany, Austria, and the U.S.A.

The second purpose of the visit is to investigate further the behaviour of a European manufactured safety frame which was involved in a fatal tractor accident in North Otago late last year.

NEWS FROM THE NORTH

The sub-station at Hamilton is now open for business, at present staffed by Keith Humphries, Geoff Lawn, and Les Anstis. John Maber will be in command, and will be joined by three of the Ministry of Agriculture and Fisheries staff, Mike Robinson, Rob Potts, and Arthur Giffney.

The Industrial Design Council has asked Keith Humphries and Geoff Lawn to assess a number of entries for a Design award. Other enquiries made to North Island sub-station include Kiwi fruit structures, fertilizer spreading and the testing and development of spray heads for Modern Farm Aids Ltd of Tauranga.

NEW PROJECTS

* Direct Drilling of Crops

A project has been started to evaluate suitable machines for the direct drilling of cereals. This will be a joint venture with M.A.F. responsible for agronomic expertise, and the Institute providing the machinery.

* Agricultural Aviation

A start has been made on a project to develop devices to give wider swath widths from fixed wing aircraft applying fertilizer.

* Electric Fencing

A high voltage test rig has been completed and will be used to testing electric fence insulators.

* Soil Moisture on Crop Yield

Arrangements have been completed for a new Institute project aimed at testing the performance of computer models to relate soil moisture to subsequent crop yields.

* Irrigation Sprinklers

A manufacturer has requested a test report on new sprinklers currently under development.

STAFF NEWS

Bob Gilbert has retired from his position as Information Officer after 12 years service.

Betty Sullivan has been appointed to the position of Secretary to the Director following the resignation of Sue Seed who has moved to Palmerston North

Miss Nicola Bell has been appointed Clerk-Typist

Warwick Gay has joined the Advisory Services Division group located at the N.Z.A.E.I. He will work mainly on aspects of poultry housing.

John Maber has been appointed as Officer-in-Charge of the Hamilton Sub-Station.

RECENT PUBLICATIONS

Davis, G.
"Engine Fuels for Agriculture from Agriculture"
November 1979. I.R. No. 99.

Warren, G.
"Specifications of Materials used and Description of Ty-a-wire Durability Test Sites."
December 1979. I.R. No. 101.

Anstis, L.J.
"The Development of Mechanised Fruit Removal from Apple Trees Grown on the Lincoln Canopy System."
February 1980. I.R. No. 102.

Hirsch, S.J.
"Guide to the Control and Protection of Submersible Pump/Motor Sets for Agricultural Irrigation Purposes."
I.R. No. 96.

Warren, G.
"Coopworth Lambs are Champion Fencebreakers."
"N.Z. Farmer." November 1979.

Steele, P.E.
"Big Balers: the Current Line-up."
"N.Z. Journal of Agriculture."
139 (5). November 1979.

Steele, P.E.
"Fodder Beet: How will we Harvest It?"
"N.Z. Journal of Agriculture."
139 (6). December 1979.

If you would like further information on any of the topics mentioned in this newsletter or on the work of the N.Z.A.E.I. please contact :

The Information Officer
N.Z.A.E.I.
Lincoln College
Canterbury

BLACKCURRANT AND RASPBERRY HARVESTING

Blackcurrants

The N.Z.A.E.I. began working on the mechanical harvesting of black currants in 1969, after four years of work, the machine developed was successful and went into commercial production.

One difficulty with harvesting machines has been to design satifactory machanical drives for some of the functions. Recent advances in the design of variable speed electric motors has made it possible to convert all the harvesting functions of the blackcurrant machine to electric drive.

The original harvester built at the N.Z.A.E.I. was converted, and completed in time for the 1979/80 harvest. Reports on the performance of the electrical systems are very favourable.

Raspberries

The N.Z.A.E.I. believes that crops should be planned from the start to be mechanically harvested. In the canopy system developed at Lincoln, the raspberry canes are trained to grow horizontally, supported by wires. The harvesting machine drives along the rows with the vibrating finger wheels over the canopy shaking the canes, and the fruit dropping onto the conveyor below.

A new model was built last year at the N.Z.A.E.I. with many improvements including hydraulic drives and an integral sorting conveyor. This machine performed well during this year's harvest, and commercial production has already begun. Peco Ltd is now building the first one for export.

CANOPY SYSTEM GIVES BONUS BENEFITS



Although the Canopy system was developed to facilitate mechanical harvesting, other benefits have become apparent, particularly with apples. Crop maturity has been very uniform, spraying has been simplified by passing a profile sprayer above and below the canopy, and a cutter bar has been successfully used for pruning.

An important additional benefit became apparent during the heavy wind and rain of 2/3 January. As the above illustration shows, the conventional apple trees on the right lost a large amount of fruit and some trees were uprooted. The canopy trained trees on the left suffered no damage at all, and fruit losses were negligible.