NZAEI NEWS

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EDITORIAL

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The Information Officer
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We also welcome comments on any item appearing in the Newsletter or on the work of the Institute.

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CULTIVATION STUDIES

The third year winter wheat cultivation trial was harvested on 2 February on the Lincoln College Research Farm. The trend seems to be one of similarity between the yield of plots with different cultivation treatments, with greater differences arising from soil changes across the paddock. The cost of equipment could be the deciding factor governing the net return to the farmer. In this case, the inexpensive Dutch harrow treatment will probably show superior net returns per hectare.

TUSSOCK OVERSOWING

All this year's trial sites and the majority of last year's have been visited by the staff of TGMLI who have assessed the frequency and vigour of both grasses and clovers. Their figures are now being analysed and will be available shortly.

HARVESTING

Raspberries

At the request of the Ministry of Agriculture and Fisheries the NZAEI Mark I harvester was used on a privately owned 0.2 hectare plot of canopy trained Marcy raspberries at Tadmore near Nelson. The machine was run through the crop nine times between 20 December and 13 January. A total weight of 1026.6 kg of high quality fruit was harvested which is equivalent to a yield of 5.48 t/ha. Trash removal rate on the harvester varied from 4.2% to 22.6%, with a rate of 4.4% during the peak picking period. Average trash over the harvest was 8.6%.

Some of the fruit from the Lincoln College raspberry crop was used for a preliminary look at the possibility of in-field cooling. A small circulating chiller unit which used solid carbon dioxide as the cooling agent was built for the operation.

Apples

An increased yield from 'H' trained canopy trees will be available for harvesting studies this year although the fruit was damaged by hail. A survey of fruit damage in the college orchard carried out by the Horticultural Department staff showed that up to 60% canopied fruit was damaged compared with less than 40% of fruit on the centre leader trees. A mechanical harvesting and catching rig to simulate the hand impactor has been designed and will be ready for the forthcoming harvest.

FENCING

Accelerated Corrosion Trial

The first batch of galvanised wire samples, taken from the accelerated corrosion trial after three months exposure, have been tested for zinc losses. One of the samples of 2.5 mm diameter 'A' grade galvanised wire, in contact with a block treated with Tanalith NCA, had lost over 90% by weight of the zinc coating, and the bare steel was rusting.

Stock Control Trials with Lambs

Four breeds of lambs have been tested against the fences found capable of containing adult Coopworth sheep. Of the four breeds only Coopworth lambs showed

any willingness to attempt to penetrate the fence with the narrowest wire spacing, which they did with alacrity.

Electric Fencing

Over a thousand plastic insulators in each of the six different polymers chosen for evaluation have been delivered. Four hundred have been mounted on battens for exposure at the ten durability trial sites. Of particular interest will be any degradation in electrical and physical properties with the exposure of weathering. Most of the remaining insulators will be included in permanent electric fence installations in selected locations so that their mechanical properties can be assessed.

ARTIFICIAL SHELTER

Strong southerly winds blowing on the back of the 100 metre long artificial fence caused some damage to both the woven synthetic shelter material and the 2.5 mm high tensile line wires. The fifty metre length containing the instrumented test pole has been preserved with the original materials, as erected in May 1978, and will be tested in this condition. Strain gauge load cells for the guy wires have been made and they are being calibrated. Some small-scale tests to estimate the porosity and drag of the woven material have been carried out. The results will be compared with the full-scale drag measurements.

IRRIGATION

Field testing of the moving sideroll irrigator has continued throughout the summer. The results of these trials will be used in refining the design of the machine.

The data from the catch-can efficiency study has been processed to the stage where graphical relationships between the various factors have been obtained. These will assist in the development of calibration functions for the various types of collector.

WASTE MANAGEMENT

The monitoring of the operation of the College dariy waste lagoon has continued. Regular sampling is taking place and instruments to measure mass transfers have been built. Final testing of the installation will begin shortly. Temperature probes have been constructed to investigate the effect of the water temperature on the pond performance. Silting and sludge accumulation and sludge transport are being studied with the aid of an echo-sounder. However, the conversion of the dairy farm from town supply to factory will obviously affect the results which will be obtained from this project.

ETHANOL FROM CROPS

After almost a year of preparation, fermentation of sugar and fodder beet to ethanol has started.

The sugar extraction is modelled on sugar beet industry methods. The beet is sliced into a reasonable approximation of "cossettes" and the sugar is extracted from them in an Institute-built leach and press vessel. This vessel operates on a batch basis and cannot match the efficiency of the continuous counter-current extractors and presses used in the sugar industry. However, it has been set up to provide the same sugar solutions, which are about 15% from sugar beet and 8% from fodder beet.

Our six litre tower fermenter located in the Microbiology Department is, therefore, working with sugar solutions representative of industrial conditions.

After two weeks of fermenter operation, modifications are being carried out to help the yeast flocculate, especially with the high sugar concentration from sugar beet; the 8% sugar solutions from fodder beet are closer to the beer worts around which the fermenter was designed.

The sugar beet stored in the clamps has now rotted and December is probably the latest storage date. Fermentation, however, is being continued using beet stored in a cool store until next season's harvest is ready in April. We hope to reduce the fermentation time down to four to five hours.

ELECTRICAL PROJECTS

Electric Drives for Agricultural Implements

Construction of the control unit for variable speed drives is now almost complete and testing will commence shortly. The unit, which is all solid state, will be used to control induction motors experimentally substituted for internal combustion or hydraulic motors on farm machinery.

Environmental Control

The prototype proportional controller has been installed in a small poultry shed at the MAF Templeton Research Centre. Thermographs made so far indicate that the controller is operating well. It is now proposed to include control of the roof vent in addition to the eave vents. This will increase the range of control of the ventilation rate. The design of a more sophisticated unit for environmental control in glasshouses is under way.

Farm Power Generation

A second version of an electronic frequency governor to control small hydro generating sets has been built. The first design, which maintained frequency by the simple process of switching a background electrical load on and off as the demand load varied, did not operate quickly enough to cater for the response of the turbine. The redesigned unit will respond within one half of an electrical cycle.

STAFF

Lins. E. Kerr has taken up a Confederation of British Industries scholarship for industrial training in the United Kingdom for a period of ten months.

HERE AND THERE

The NZAEI was represented at the inagural meeting of the reconstituted Piggery Wastes Committee held on 31 January. At the meeting the Committee defined its concerns as the circulation of information, the development of guidelines for the design and management of waste treatment systems, and the direction and coordination of research and development.

Peter Carran presented a paper, "Computer Analysis of Overhead Sprinkler Frost Protection Systems", to the 49th ANZAAS Congress in Auckland.

Numerous visitors from within New Zealand have been interested in fruit harvesting, whole crop cereal harvesting, potential new lines for a small engineering company, automatic irrigation valves, trickle irrigation, garlic harvesting and planting, alternative cropping systems, precision seed drilling, liquid fertilizer application, and spray relief valves.

PROTECTIVE FRAME AND CAB TESTING

A recent safety frame test was made on an OECD approved frame which is to be partly manufactured in New Zealand. Steel comparable to that used in the OECD approved design is not directly available from local suppliers and New Zealand manufactured cold formed sections had to be specially heat treated. This highlights, once again, the differences between hot and cold formed sections, and the difficultues experienced by local manufacturers when the locally produced cold formed section is not suitable.

NZS 5101: 1978, the revision of NZS 2146: 1967, *Safety frames and safety cabs for attachment to agricultural wheeled tractors*, was declared to be a Standard Specification on 22 December 1978. From that date safety frame testing has followed the new standard which provides, basically, for less rear impact energy, reduced energy in the front impact on tractors lighter than 2000 kg, and the deletion of the front impact deflection limit which is replaced by a limit on the rear impact deflection. The revisions bring the New Zealand test procedure closer to those of the ISO and the OECD.

RECENT PUBLICATIONS

PROJECT REPORT

P/17 Three dimensional computer drawings for agricultural engineering. G.J. Harrington $2.50

PAPERS BY NZAEI STAFF

Painter, D.J.
Soil erosion rates on New Zealand farm land
Proceedings of the Erosion Assessment and Control Conference: 25-42. N.Z. Association of Soil Conservation, August 1978.

Painter, D.J. and Jones, M.W.
Close to the Wind
N.Z. Farmer, Vol.100 (in press).

Steele, P.E.
Power Harrows in New Zealand
MAF Conference Proceedings, Lincoln College, November 1978.

DRILLING PRAIRIE GRASS

The Grasslands Division of DSIR predicts that *Grasslands Matua* prairie grass (Bromus Willdenowii) has great potential for increasing livestock production in the foreseeable future. It is vigorous, highly productive and grows throughout the winter months. But its long terminal awn and relatively low density make drilling particularly difficult. Requests were received by the Institute from both DSIR and the Ministry of Agriculture and Fisheries for assistance in finding a solution to this problem.

The drilling difficulties appeared to arise, primarily, from the hooked spine of the long terminal awn. Any seed carried in the hopper of a drill will compact with the vibration generated by the movement of the drill over the ground. With most seeds this is of no consequence. But as prairie grass seed compacts, the awns, driven closer together, hook and reduce the individual seeds to a lightly attached mass. The lightness of the seeds compounds the situation because individual seeds lack the weight to break free. The result is extremely irregular distribution.

Institute staff suggested that the seed should be mixed with a flowable material whose density approximated to that of the seed. Coarse sawdust and hammer milled pinus radiata bark were advanced as possibilities.

Subsequent laboratory trials looked promising and field tests with a standard Duncan drill fitted with a conventional agitator confirmed this. The best results have been obtained when the seed is mixed with sieved dry Pinus radiata sawdust in a 50:50 ratio by weight. A 6 mm sieve should be used. The particles of milled bark did not function so well. They were sufficiently fine to drop down between the seeds when the hopper was vibrated.

The seed should be treated with a suitable fungicide such as benomyl (Benlate) and sown at a rate of 20 kg/ha. Sowing depth should be 25 mm and deeper sowing should be avoided. Clover can be sown with prairie grass but the seeds should not be mixed in the hopper. The clover should be either sown from a separate box of mixed with the superphosphate.



Part of the building under construction to house the Agricultural Engineering Teaching Department. Although it will provide accommodation for a few N.Z.A.E.I. staff the main N.Z.A.E.I. building is planned to occupy the vacant area on the left but, so far, there has been no grant to allow construction to begin.