The NZAEI NEWSLETTER

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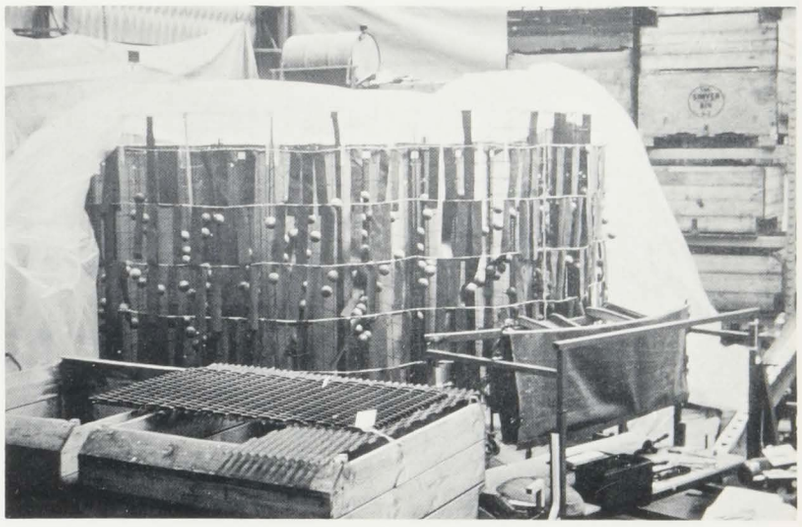
Some Overseas Developments in the Mechanisation of Process Cropping and Orchard Work

John Dunn, who has been abroad for seven weeks, has just returned to the Institute. While away he visited a number of horticultural and agricultural research stations and many farms in Australia, the United Kingdom and on the West Coast of the United States. In particular, of course, John was interested in the trend towards complete mechanisation of agricultural and horticultural operations and the increasingly large scale of process cropping. While away he saw many novel developments and he has taken this opportunity to pass an account of some of these on to NEWSLETTER readers.

On his first day in Australia, after addressing officers of the Victorian Department of Agriculture on his row crop work he visited the Engineering Department of Melbourne University. At their tractor-testing station at Werribee he watched the testing of spark arrestors. The escape of sparks from tractor exhausts creates a considerable fire hazard under Australian conditions where the undergrowth is often tinder dry for long periods.

The next day he visited a highly organised property at Cobram, 160 miles north of Melbourne, where 650 acres of peach trees are grown. A full size ex-airforce hangar has been converted to house tractors and implements. Each tractor has a bay provided with access to compressed air, fuel, oil and electric power. The locally made grading plant, also housed in the hangar, has enabled 225 tons of peaches to be handled in a 10 hour day. The owner has grown 100 acres of onions this year using a 12 row precision drill.

In the Dandenong area John visited a vegetable growing property run by Les, Frank and Roy Allan. Sixty acres of sprouts as well as celery, parsnips and lettuce were being grown. The celery was packed in containers of wire and slats which were machine assembled and closed. They were light and strong and the open construction allowed air to circulate through the contents. The lettuces were packed in waxed cardboard cartons. All celery and lettuce packs were hydro-cooled before despatch by submerging them in chilled water to remove field heat so prolonging their freshness. The cooling water is chilled by running it over an ice bank.



Artificial tree at N.I.A.E.

While in the Dandenong area John also visited the Scoresby Horticultural Research Centre. Here there were two projects of interest. The first was a field-scale trickle irrigation method which promises several advantages. The system, a development of that used for some years in glass-house culture, uses lateral plastic piping which may be attached to orchard trees out of the way of cultivation or alternatively laid by the trees on the ground, or along rows of crop plants. A water pressure of only 5 to 30 lbs is needed. Where ever an outlet is required to supply a tree or plant the tube is punctured and a micro-tube having a bore of perhaps only half a millimeter is inserted. Friction within the micro-tube provides a convenient way of regulating the flow and the length of the tube is adjusted accordingly. Flow rates from a tenth to two gallons an hour can be obtained. The trickle system is claimed to save at least half the water which would be required by conventional systems. Futhermore, the growth of weeds is not encouraged as the water goes only where it is wanted and there is no run-off. Erosion which can occur where horticultural crops on sloping country are irrigated is eliminated. The material cost of commercially installing the system in an orchard with 100 trees to the acre is expected to be about 40 to 50 dollars an acre in Australia.

The second project was the

development of a powered bed-former for use in strawberry growing. This machine produces high beds which are smooth and firm and completely regular in profile so that the covering black polythene is in intimate contact over the whole bed area. Heat energy from the sun can pass directly into the soil from the polythene. No insulating air pockets occur as with conventionally formed beds.

A strawberry grower on fairly steep property in the Dandenong Ranges has incorporated both the trickle irrigation system and machine-formed beds in readiness for the coming season. He expects a considerable improvement in yield and a cure for the erosion which has previously taken place.

On 27 July John arrived in the United Kingdom.

At the factory of Stanhay Ltd who manufacture precision seed drills John saw a demonstration of tape seeding. In this technique, which is still under development, plastic tape containing the seeds spaced at the required distance apart is unwound into the soil from a reel carried on a simple drill chassis. In contact with moist soil the tape disintegrates immediately and the seeds are released.

While with the National Institute of Agricultural Engineering at Silsoe John examined prototype blackcurrant and strawberry harvesters. He was also shown an artificial tree which could be adjusted to simulate fruit distribution following different methods of pruning. This device was being used to design mobile picking platforms which will enable the pickers they carry easy access to all parts of the tree.

While at the Royal Agricultural Show it was interesting to note the number of full width fertiliser spreading machines on display. Only one spinner type was being exhibited. The pneumatic principle of fertiliser spreading was used in two machines and has also been applied to seed drilis. These machines are of great width and considerable use has been made of plastics in their construction.

Several versions of the Dutch harrow, which is attracting considerable notice in New Zealand, were on display. However none of them was fitted with an articulated mounting such as has been developed for the NZAEI version to allow for turning in work. Three manufacturers were exhibiting PTO driven reciprocating harrows.

In Lincolnshire John visited a farm which devoted 200 acres to cauliflowers and where a single machine had been harvesting over 30 tons of potatoes each day for two weeks. This same farm had 80 acres in freezing beans. An old fashioned cup-feed drill was used for sowing the beans as it gave a very even distribution of the seed.

Another farm visited supplied cauliflower plants for transplanting throughout the area. Twenty million plants were raised each year. The seed was sown in Dutch light ranges using a small Danish multi-row precision drill with an overall width of only two feet. This machine could perhaps find application in the raising of tobacco plants in this country.

On his way back to New Zealand John spent almost a week in California using the Davis campus of the University of California as his base.



Full width fertiliser spreader at the Royal Agricultural Show. One arm is raised in the transport position.

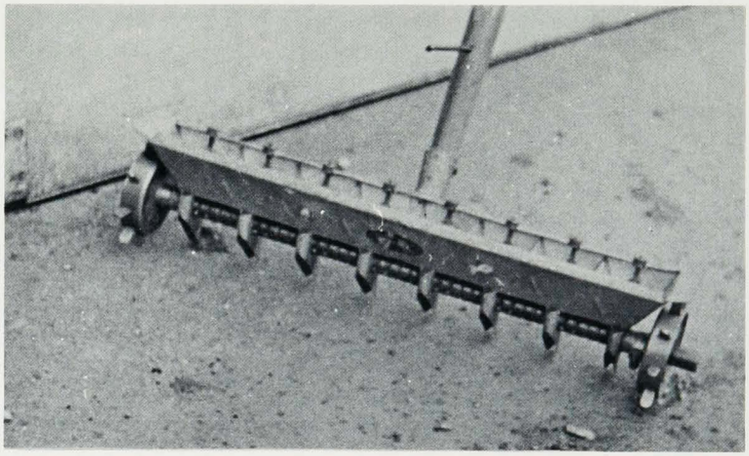
One day was spent in the Salinas valley where lettuce are grown on a large scale. They are harvested using self-propelled harvesting platforms each of which is manned by 35 workers. The lettuces are cut and trimmed by hand and enclosed in plastic overwraps which are shrunk around each lettuce as it passes on a conveyor through a tunnel heated by natural gas burners. The treated lettuces are packed two dozen to a cardboard carton on the platform. Field heat is removed by vacuum cooling at a central depot in Salinas. By subjecting the crated lettuces to a reduced pressure of only 5mm mercury they are cooled to 35 degrees Farenheit in 30 minutes. They are then carried under refrigerated con-ditions by road and rail to all parts of the United States. This year in the Salinas county there are 50,000 acres under lettuce alone. Other crops grown are celery, cauliflower, garlic and globe artichokes.

A considerable amount of animal manure is still being used in this vegetable growing district. It is trucked from beef feed lots over a very wide area surrounding Salinas.

John was told that from midnight to 7 a.m. the fields were as busy as city streets. The reason for the activity at these unusual hours was the spraying programme. This essential work was carried out during the very early morning to take advantage of the windless conditions and so avoid drift.

There are considerable areas of orchard, particularly in the Sacra-

mento valley area. Mainly peaches, pears, prunes and cherries are grown. Five percent of the peaches are now being mechanically harvested by shaking machines although the fruit has to be immediately transported to the canneries so that the bruises will cook out without discolouring the fruit.



The miniature Danish precision drill.

Pears are picked using harvesting aids. A mobile platform developed by the University of California carries 12 operators who can fill a 1000 pound bin with fruit in 10 minutes. The pear trees are about 15 feet high and some have been hedge pruned mechanically using circular saws so that the trees are reduced to a spread of three feet from the trunk to either side. This drastic cutting reduces the yield in the season following treatment but by the second year yields are normal again. The aim is to allow pickers easy access to all the fruit while working from the mobile platforms.

To aid further fruit harvesting the Agricultural Engineering Department at Davis has constructed a super tree-shaker driven by a seventy horse power motor and operated hydraulically. This machine is so powerful that a tree is only shaken for a split second and the fruit is deposited on a catcher 29 feet wide. If the shaking is prolonged the tree flies to pieces.

Over the last six years tomato harvesting in California has become almost completely mechanised although the present harvesters cost some 30,000 dollars each. At Davis a 'clothes-line' method of mechanical harvesting is under development. A cord of polypropylene joins the tomato haulms together just above the ground. The haulms are cut between the cord and the ground and one end of the cord is fed into the machine. The laden plants are then pulled through the machine and the fruit removed. The method has two advantages. The tomatoes are in the right attitude — stalk first — for the machine to remove them efficiently. Secondly, the haulms are removed more or less completely as the cord is pulled through the machine and this avoids the building up of a mass of jumbled stalks and leaves which reduces the effectiveness of separation on existing types of mechanical picker.

Asparagus, which was once widely grown, has now diminished in importance. Its attractiveness as a crop has declined because of successful competition from growers on Taiwan.

John arrived back at the Institute on 6 August feeling that he had seen something at least of the work being done in developing process cropping and in row-crop and orchard mechanisation generally. He is hopeful that some of the work being carried on overseas can be applied back here in New Zealand.

Senior Institute Research Fellow 1969/70

The Institute is fortunate to have, as a senior research fellow, Professor Wesley Yates of the University of California.

This appointment is one of six fellowships awarded on the recommendation of the New Zealand Research Advisory Council. The fellowships, which were designed to attract overseas scientists to work in New Zealand for periods of up to one year, have provided an opportunity for the Institute to benefit from the specialised experience of an outstanding worker in the field of agricultural engineering.

Professor Yates is a senior member of the Agricultural Engineering Department at the Davis campus. Davis is one of the seven campuses of the University of California. The college is situated near Sacramento.



Professor W. Yates

Up until not so long ago Davis specialised in agriculture but now it is a general campus and is attended by over 12000 students. The 1500 or so students of agriculture feel a little as though they have been pushed into a corner of what was once their own house.

Professor Yates has had considerable research experience in the

application of agricultural chemicals with particular emphasis on spreading these from aircraft.

While in New Zealand he will set up equipment for the investigation of aircraft spraying systems.

"The basic factors affecting the spreading of chemicals from the air," said Professor Yates, "are wind velocity, temperature and droplet size. We aim to obtain micro-weather data at various places by the use of sensitive meteorological instruments mounted on portable masts which will be erected in the areas under investigation."

In addition there will be some evaluation of the particle size and distribution from various types of equipment at present in use in New Zealand. Besides work at the Institute considerable activity is planned for the field. Problem areas will be inspected and equipment will be set up as necessary to see if any improved ways of working can be suggested.

"I hope," said Professor Yates, "to start off with some sort of tour to meet the major aircraft operators in New Zealand. I want to become familiar with the kind of country over which agricultural aircraft work and I want to meet as many operators as possible and talk over any problems with them. In this way I hope some initial direction can be given to the work I will be doing here".

Professor Yates holds a current private pilot's license which he finds very useful as his flying experience often allows him to better appreciate the conditions under which the aerial work is carried out.

John Hager of the Institute staff, who also holds a private pilot's licence, will be working with Professor Yates on his research programme.

National Machinery Field Day

The Institute was represented at the recent successful National Machinery Field Days held at Te Rapa near Hamilton.

Organised by a Hamilton committee, the Field Days provided the opportunity for manufacturers and individuals to display equipment and to demonstrate its capabilities to farmers and those connected with the industry.

The event proved very popular and attendance figures far exceeded the expectations of the organisers. The interest aroused should ensure the continuation of the event. The emphasis throughout was on working demonstrations rather than static displays and the competitive spirit evident added to spectator interest. An Institute information stand was staffed for the two days and handled enquiries covering a wide range of farm engineering topics.

A highlight of the show was the first national fencing competition. This attracted large crowds and a high standard of workmanship was in evidence throughout the event. One-man and two-men teams worked with specified material and equipment to erect a standard seven-wire fence. The Director of the Institute, assisted by Keith Humphries, acted as one of the judges.

Manufacturers of tractors and utility vehicles made the most of the opportunity to provide spectacular displays of performance and characteristics on the steep test area within the grounds. Few of the tractors, however, were fitted with safety frames.



The Institute Stand at Te Rapa

Other exhibits covered a wide range of items from milking machines to agricultural aircraft. Institute staff made the most of the opportunity to inspect as much of the equipment as time permitted, and to hold very worthwhile discussions both with manufacturers and operators.

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