

for various purposes such as hoeing. At the National Institute of Agricultural Engineering, Howden, Midlothian, some interesting new attitudes are developing, however. For one thing herbicides have eliminated the need for close manual procedures which means that it is no longer necessary to grow all crops in single rows. There would be distinct advantages in growing potatoes, for instance, in beds as wide as three or four rows. It would be more economical of land, earthing-up could be done quicker, and the soil would suffer less from the compressional damage done by agricultural machinery.

There is a drawback, however. Traditional tractor design does not permit the use of wide strips; and no one elsewhere seems to have given much thought to ways in which tractors could be improved. At NIAE engineers have had a hard look at what farmers are going to need in the future and have designed an impressive "self-propelled, multi-purpose toolframe", which could well come to dominate our rural landscapes in a few years' time. Essentially it consists of a large box frame, supported at chest-height on conventional tractor wheels—a large pair at the front and small pair at the rear corners. At the front of the frame in the centre is a powerful, 70-horsepower tractor engine coupled to the driving wheels by independent oil-driven hydrodynamic motors.

The driver sits high up on the rear member of the box frame in a seat that can be hydraulically shifted from side to side, or turned right round to face the reverse direction. He has two levers at his left hand; both forward gives a range of forward speeds; both backward, reverse speeds. By moving them independently the wheels will revolve at different rates and assist turning. The rear wheels are telescopically mounted and can be raised or lowered hydraulically. They are self-levelling over uneven ground. Agricultural implements are mounted—without the need for soil-damaging wheels—in the centre of the box frame. Implements, likewise, can be designed for hydraulic operation and the frame is equipped with two large oil tanks at each front corner and several hydraulic take-off valves. The whole contrivance is simplicity itself to control.

A planting unit has now been constructed that will plant and ridge four rows of potatoes in one operation. Work is also in progress on a double-row harvester.

That tractor wheels are indeed harmful to soil has emerged from a unique field study at the institute. Using a gamma-ray probe and detector, researchers there have been able to observe for the first time the actual local profiles of soil density across tractor ruts, plough furrows and the like. They have related these to the failure of plants such as raspberry canes to grow where the soil has become compacted. Clods are also typically the result of the passage of heavy machinery across the soil so that cutting down the extent to which tractors and wheeled vehicles run over the soil will undoubtedly improve production.

This is by no means the only application of modern methods of science to farm mechanization at NIAE. Novel work under way aims at automated singling of sugar beets. Again it is herbicides like paraquat that have made such advances possible. Manual thinning by hoe is tedious and expensive. The plan is to use a machine equipped with photoelectric detectors sensitive to the spectral absorption lines of the green chlorophyll pigment in leaves. Signals from this device, indicating the density of foliage, will control a paraquat spray which will squirt the excess plants, leaving only those required at specified intervals for optimum growth.

Engineering data during field trials on new equipment is about to be collected by radio telemetry, and modern data-processing methods are under development at NIAE.

REPORT OF A NEW CHEMICAL HAZARD

A Swedish research worker has expressed concern over the increased amounts of polychlorinated biphenyl (PCB) entering the air, presumably from industrial smoke and rubbish-dump smoke, and being absorbed by water and taken up by fish and later humans. PCB which is related to and as poisonous as DDT was detected by Mr Sören Jensen of the Institute for Analytical Chemistry, University of Stockholm, in some 200 pike taken from different parts of Sweden, fish and fish-spawn throughout the country, an eagle which was found dead in the Stockholm Archipelago, and in his own, his wife's and his baby daughter's hair. As the baby is only five months old her father concludes that she got her dose of PCB with her mother's milk.

It is not known at present how much of this substance is dangerous or even fatal. If it is comparable with DDT then the limit would be 0.5 mg per cubic metre of air—and, for comparison, the dead eagle had at least 10 times as high a concentration in its body. For purposes of elimination Mr Jensen has obtained feathers from eagles preserved at the Swedish National Museum of Natural History since 1850 and has detected PCB first in an eagle from 1914.

In Sweden, PCB is known to be used in electrical insulations, hydraulic oils, high-temperature and high-pressure lubricating oils, paints, lacquers and varnishes, and as pigments in various plastics. It does not seem to be used as an insecticide. It is not destroyed by incineration and may enter the body directly through the skin, by breathing, or by way of food (especially fish). It is particularly harmful to the liver, and also the skin; this has been demonstrated by experiments on mice. PCB is much harder to break down than DDT and there is every reason to suppose that it is much more difficult to get it out of the system. The substance has also been detected in the air over London and Hamburg and also in seals caught off Scotland. It can therefore be presumed to be widespread throughout the world.

LOAVES AND FISHES

The famine which now threatens parts of India has tended to focus the attention of the developed countries on that sub-continent's chronic inability to feed its teeming people, but a warning note came last week from another less publicized area. Dr B. R. Sen the Indian Director General of the UN Food and Agriculture Organization was addressing a regional conference at Punta del Este, Uruguay. He lambasted the governments of Latin America for their unwillingness to face what could be "a very serious situation indeed". It would take, he said, an increase in food production of four per cent a year to stem "social and political unrest which still prevails", or even to prevent it from worsening.

Dr Sen's warning comes none too soon. Malnutrition if not actual hunger is widespread in Latin America, where per-capita food production has dropped by four per cent in the past six years. At the same time the population is expected to double itself (to 422 million) by 1985. Dr Sen believes the four-per-cent rise to be technically feasible, if an all-out effort is made now.

Apart from the struggle to increase food supplies to keep pace with population, however, efforts are also being made to overcome traditional prejudices against various foods which may be plentiful though neglected.

In the waters of Lake Victoria, for instance,—they cover an area about the size of Ireland—there are vast shoals of tilapia, a firm white fish, weighing about 8 oz and very tasty. European firms have already asked the Tanzanian government about the possibilities of sending frozen fillets to Europe but the local people are by no means as keen to eat this sort of fare.

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