Potato yield. The number of severely damaged potatoes per hectare was 10 ts with the conventional technology or 1.8 times more. If we take 3 EEK as the potato sale price the lost profit is 3000 EEK per hectare. By taking the yearly work amount of Scottish technology machinery 80 ha the summed up lost profit would have been 240 thousand EEK

Conclusions. Due to large potato tuber damage the losses in the whole country can be summed in tens millions EEK's. Unfortunately not all potato growers in Estonia realise the severity of problem fully.

As one of the reasons of damage is the stoniness of fields, potato growing in stony fields should be given up (why make unnecessary costs) or to use alternative technologies suitable for stony soils.

As the best alternative the Scottish technology has proven itself. The two year tests comparing the Scottish technology with the conventional one gave as an average 51.4 ts/ha more yield of mechanically undamaged ware potato with the use of the new technology. As the new technology machinery is expensive, a thorough economic analysis should be made.

WEED CONTROL WITH INTER-ROW HOEING IN CEREALS

Timo Lötjönen and *Hannu Mikkola*
Institute of Agricultural Engineering, MITNAKOLA, Vakolantie 55 FIN-03400 Vihti

Weed control is one of the most difficult problems to solve in organic agriculture, since herbicides cannot be used. In planning the crop rotation and in all operations relating to cropping the goal must be to prevent the spreading of weeds. In spite of this, the weeds may still become dominant and mechanical weed control is needed.

The organic farmers mostly use weed harrows with long tines to control weeds in grain fields. Research and practical experience have shown that the effect on annual weeds varies within wide limits. The effect of the weed harrowing is affected by timing, technical realization of the operation and the weather. Weed harrowing has little effect on perennial weeds. These are the reasons, why inter-row hoeing has been started to research in cereals. Inter-row hoeing has been used for decades to control weeds in row-plants (e.g. sugar beet, maize). Our tasks is to study in Finnish conditions, how to build a cheap hoe suitable for cereals, which are the benefits of inter-row hoeing and to find out the capacity of this method.

An old hoe for inter-row hoeing of sugar beets was modified suitable for cereals. We knew on the basis of foreign studies that the normal row spacing 12.5 cm is too narrow for inter-row hoeing. Thus we tested row spacings 18 and 25 cm. Duckfoot sweeps are used in the hoe and a 7_8 cm wide unhoed strip are left around the crop row. Steering of the hoe is based on two grooves, which are ripped into the ground in connection with the drilling. The special-designed wheels of the hoe follow these grooves.

All row spacings were sown by the same 3 m combined drill and by using the equal seed rate per hectare (500 kernels/m^2). Increasing the row spacings from the normal 12.5 cm to 25 cm decreased the yield of barley 10-15% and correspondingly chancing to 18 cm decreased yield on the average 4%. The yield loss was higher with inter-row hoeing compared to the weed harrowing or rotary hoeing. These methods were used in normal 12.5 cm rows, which explains the difference.

In 1997 there was 34-38% dry matter of weeds left after inter-row hoeing compared to non-weeded parcels. Correspondingly chemical spraying left on the average 23% dry matter of weeds. Long tine harrow had quite good weed effect in silty clay soil. In mould soil the effect was not as good. Weeds left after treatment varied on the average 71-98%. The weed effect with rotary hoe was slightly poorer: on the average 113% dry matter of weeds were left.

Mechanical weed control has not equal weed effect to chemical control. The amount of weeds has a tendency to increase more after mechanical methods than after chemical control, especially in wet weather conditions or in mouldy soils. This can be partly compensated by repeating the mechanical treatment 2 or 3 times.

Inter-row hoeing does not require special vigilance of the driver, since the hoe steers itself. The driver's task is to steer the tractor along the extra-wide inter-row spaces made for the tractor wheels. The hoe has damaged the crop only on sloping areas, where the sweeps have come too close to the row. Inter-row hoeing in the field with 18 cm row spacing was not difficult either, because the sweeps were then narrower. The capacity of a 3 m hoe is 1 ha per hour in normal conditions. The driving speed may be 5-10 km/h.

The yield loss is higher with inter-row hoeing compared to other mechanical methods. However, in organic farming it can be wiser to strive at low weed rates than at maximum yields. Reducing row spacings for example to 18 cm can minimize yield losses. It demands modifying of the drills.

USE OF GPS IN FERTILISER I YIELD TRIALS

Krister Persson and *Hans Skovsgaard*
Danish Institute of Agriculture Science, Research Centre Bygholm, P.O. Box 536, DK-8700 Horsens

In 1997 the use of DGPS in fertiliser/yield trials was investigated in Denmark. Traditional plot experiments having small even fertilised plots, have been replaced by large plots divided into smaller plots, fertilised in one run by use of a distributor controlled by a DGPS system. A distributor have been equiped with a stepless gear box which was controlled by an electric actuator. The position of the actuator was given by a fertilisation programme called KEMILORIS.

Tests were carried out in three places in Denmark when winter wheat and spring barley were fertilised. In the three trials 180 and 620 m long plots were set up. Each plot was divided into subplots each measuring 20×6 and fertilised with an amount differing 20 kg of N from the amount in the nearby plots. By use of a 3 m full-width fertiliser distributor the reproducability of the system was tested, as each part of the subplots was to be fertilised equally to te other one.

The plots were fertilised in the spring. During the work the machine settings were recorded and compared to the desired settings and amounts of fertiliser in each plot. In two of three places the fertilisation was carried out by running the machine in the same direction of the field in all plots. In one place each half-plot was fertilised in two opposite directions. In the autumn the plots were harvested by a 4 m Dronningborg combine harvester equipped with a yieldmapping stystem.

The results of the trials show that the accuracy of the fertilisation differed a little from what was expected