

**Part III.**  
**ABBREVIATED TEST REPORTS**

THE UNIVERSITY OF CHICAGO



# AGROMACHTEST

NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING (MÉMMI)  
H-2101 Gödöllő, Tessedik S. u. 4.

## RÁBA-Rabawerk Condor heavy-duty ploughs

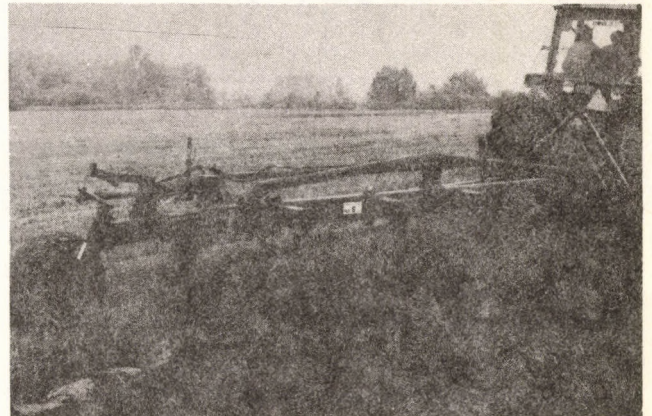
Agricultural Machinery Works According to the license of Rabawerk /Federal Republic of Germany/. The ploughing quality of the semi-mounted plough was good for cereal and sunflower stubble, as well. The turning effect of the plough was especially favourable on sunflower stubble. The semi-mounted ploughs can be pulled by the tractors of the 20 to 30 kN pull category at 6 to 10 km/hour working speed. The reliability was found to be excellent  $/K_4 = 1,00/$ . The workrate of JD-4630 tractor and four furrow semi-mounted plough combination was 0,9 hectares/hour. The functional performance of the ploughs for deep ploughing of different soil types is good.

Main technical data:

- working width: 2.0/1.6 m
- no. of plough bodies: 5/4
- working width per plough: 400 m
- clearance: 1,000 mm
- height of frame: 800 mm



Manufacturer: RÁBA MMG, Mosonmagyaróvár, Hungary  
Test No: 454



Manufacturer: RÁBA MMG, Mosonmagyaróvár, Hungary  
Test No: 454

## RAU Chiselam suspended chisel ploughs

The working quality of the machine is similar to that of the other chisel ploughs used in Hungary. The chisel plough can be used with tractors of 130 kW engine performance. The reliability is fair  $/K_4 = 0,95/$ . The workrate of JD-4630 tractor and chisel plough combination is 1,1 hectares/hour. The functional performance of the machine is fair for medium deep soil loosening.

Main technical data:

- working width: 2.5 m
- working depth: 300-500 mm
- no. of chisels: 5 units
- clearance: 500 mm
- height of frame: 900 mm

## HCS-12 roll series

The working quality of the smooth and ring type rolls was favourable for breaking and for soil surface smoothing on loose soil. The soil surface pressure can be further to improve the soil compressing effect without energetic problems. 57 to 110 kW tractor engine performance can be used for the high values of the working width. The reliability is excellent  $/K_4 = 0,98-1,00/$ . The workrate of the smooth rolls and ring type machine was 7,1 and 6,7 hectares/hour, respectively. The higher workrate was achieved with T-150 K and the lower one with MTZ-82 tractor. The functional performance of the family or fells is good for different soils: for surface compression and for cultivation, as well.

Main technical data:

- working width: 12.7 m
- no. of rolls: 7 units
- no. of roll rows: 2
- types of rolls: ringed and plain



Manufacturer: AGRIFON, Kecskemét, Hungary  
Test No: 457.



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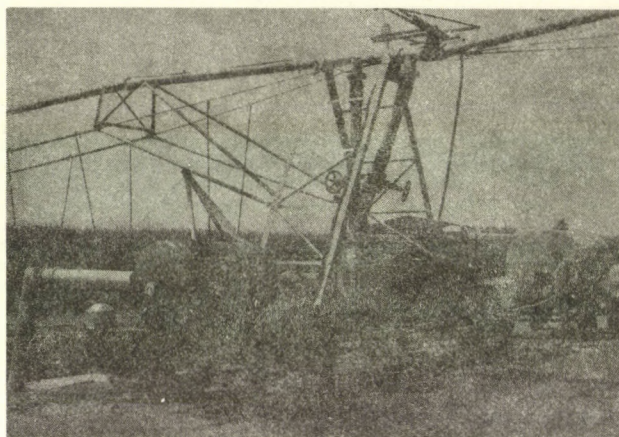
### Bauer line Star irrigation equipment

The nominal flow rate of the system is 500 /250/  $m^3$ /hour at 1,3 bar nozzle pressure. The irrigated area is 342 hectares. The workrate - for the total working period - is  $W_{03} = 326,6 m^3$ /hour /8,94 hectares/hour/. The reliability is  $K_4 = 0,96$ .

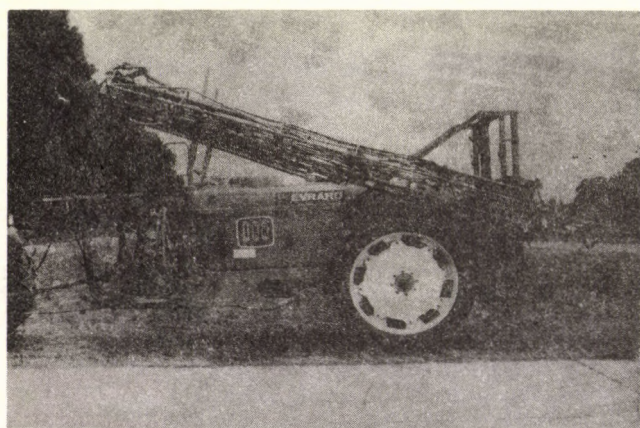
The system can be easily operated and its specific energy requirement is low.

Main technical data:

- working width:	1091.5 m
- no. of supports:	20 units
- support clearance:	52.6 m
- pump capacity:	500 $m^3$ /W
- irrigated area:	342 ha



Manufacturer: BAUER A.G. Austria  
Test No: 458



Manufacturer: ETS Evrard, France

### Evrard Pul 32 DPA SP field sprayer

The machine can be used to distribute different liquid fertilizers solution and suspensions/, with the tested TK-SS 30L nozzles. According to the test results the workrate of the machine was:  $W_1 = 18,34$  hectares/hour for real working time/, and  $W_{01} = 12,26$  hectares/hour for productive working time/. The machine distributed 203 to 787/hectar water and 155 to 742  $dm^3$ /hectar suspension in the 6 to 12 km/hour forward speed range. The characteristics of the working quality - pressure loss, flow rate and pressure distribution, longitudinal and transversal evenness of spraying - met the agrotechnical requirements.

Main technical data:

- working width:	24 m
- tank capacity:	3.2 $m^3$
- pump delivery:	440 $dm^3$ /min
- tractor required:	60 kW

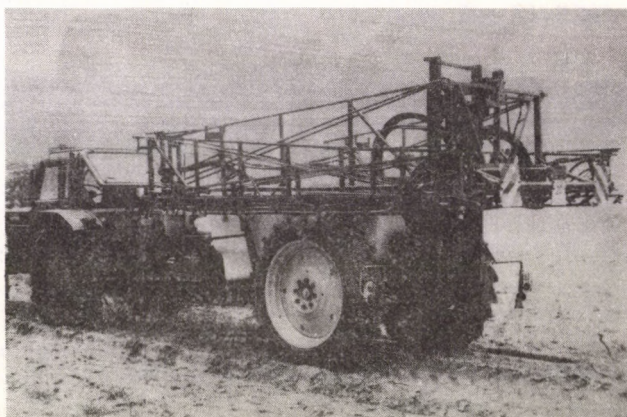
### Kertitox-Favorit F-20/18 field sprayer

The machine can be used to distribute different liquid fertilizers /solutions and suspensions/ with the tested UL-3.4,5 and UL-3.6 nozzles. The workrate of the machine was:

$W_{01} = 11,47$  hectares/hour for /real working time/ and  $W_1 = 8,75$  hectares/hour for /productive working/ to 386,0  $dm^3$ /hectar water and 326,0 to 1 776,0  $dm^3$ /hectar suspension in the 6 to 12 km/hour speed range. The characteristics of the working quality - pressure loss, flow rate and pressure distribution, longitudinal and transversal evenness of spraying - met the agrotechnical requirements.

Main technical data:

- working width:	18 m
- tank capacity:	2.0 $m^3$
- track clearance:	1,500 - 1,900 mm
- track width:	240 mm



Manufacturer: MEZŐGÉP, Debrecen, Hungary  
Test No: 460.



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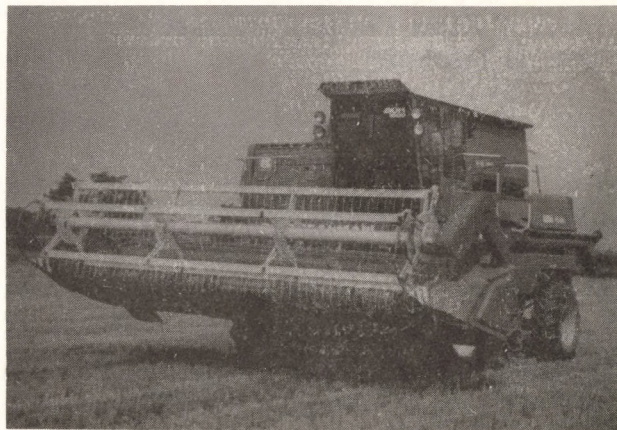
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## DON-1500 combine harvester

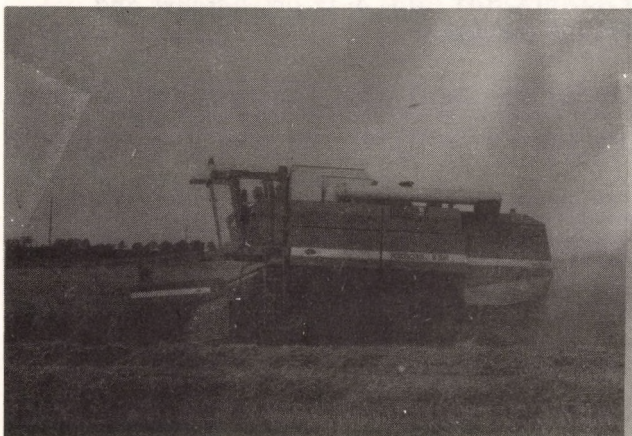
The combine harvester of conventional construction can be used to harvest wheat and corn /grain/. The throughput of the machine was found to be 10,5 kg/s for wheat harvesting and 17,3 kg/s for corn /grain/ harvesting. The workrate and working quality characteristics of the combine harvester are fair. The technological reliability is good, but the technical reliability in corn harvest does not meet the requirements. The engine performance is fair and the specific fuel consumption is good.

Main technical data:

- thresher drum dia:	800 mm
- thresher drum length:	1,500 mm
- cleaning area:	4.19 m <sup>2</sup>
- straw shaker surface:	6.02 m <sup>2</sup>
- seed tank capacity:	6.0 m <sup>3</sup>
- engine capacity:	162 kW



Manufacturer: ROSTSZELMAS, USSR  
Test No: 461.



Manufacturer: VEB FORTSCHRITT, GDR  
Test No: 462.

## E-524 combine harvester

The combine harvester of conventional construction can be used to harvest wheat and corn /grain/. The throughput of the machine was found to be 7,1 kg/s for wheat harvesting and 13,8 kg/s for corn /grain/ harvesting. The working quality of the machine of medium category is fair. The performance of the engine is fair and the specific fuel consumption is good. The technological reliability is good, but the technical reliability should be improved.

Main technical data:

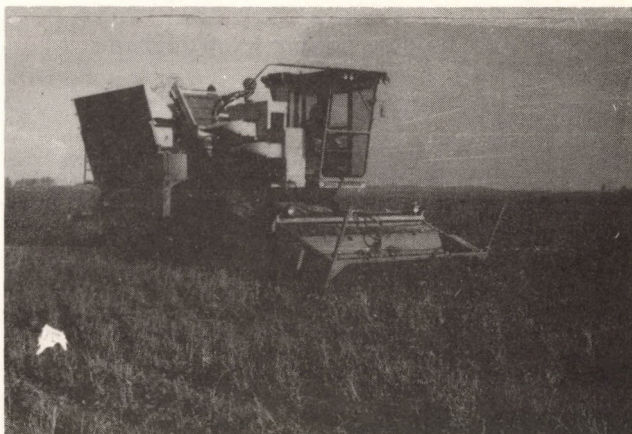
- thresher drum dia:	600 mm
- thresher drum length:	1.275 mm
- straw shaker area:	5.2 m <sup>2</sup>
- seed tank capacity:	4.8 m <sup>3</sup>
- engine capacity:	112 kW

## PIXAL-Beanstalker green beans harvester

Specification: working width: 3,05 meters, hopper: 8,8 m<sup>3</sup>, height of hopper tipping: 3,75 meters, wheel drive: four wheel drive, transmission: hydrostatic, mass: 10,3 tons, engine performance: 106 kW.

The workrate of the machine was - for real working time -  $W_1$  - 6,60 tons/hour, as an average value and 0,70 to 1,08 hectares/hour. The cleanliness of the green bean harvested was 88 to 97%, 72 to 81% was not damaged, 4 to 16% was of cluster character, 8 to 15% was slightly damaged and 6 to 7% was damaged. 1 to 11% of the yield remained on the straw and 8 to 18% was the loss that remained on the stubble.

The machine can harvest approximately 250 hectares of green bean yearly when the production process is well scheduled. The smoothness of soil surface is of great importance.



Manufacturer: PIXAL Corp., USA  
Test No: 465.



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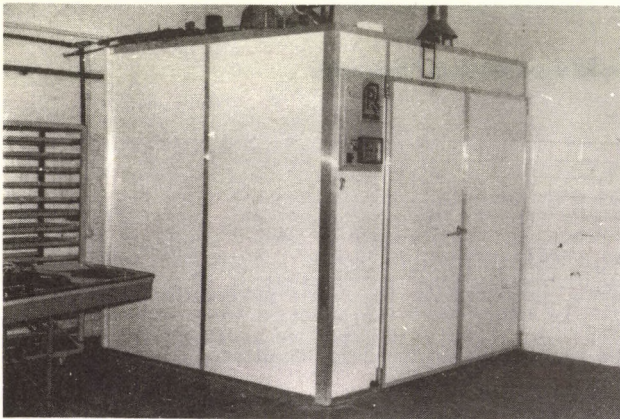
## ASA-LIFT Super Combi MINI root vegetable harvester

The machine can be used to harvest root vegetables, onion and lettuce in one step operation. Different attachments should be mounted on the harvester to make it capable for harvesting the different crops.

The workrate of the machine is 0,8 to 1,0 hectare/hour depending on the row width of the crop. The throughput of the machine was  $W_{02} = 22$  tons/day for cellery and  $W_{02} = 29$  tons/day for carrot. The loss was low for both of the crops mentioned. The reliability was  $K_4 = 96\%$ . The machine is fairly good according to the test results and experiences.

Main technical data:

- working width: 1 row
- tractor required: 35 kW



Manufacturer: PASREFORM B.V Netherland  
Test No: 471.

## Trough-type poultry feeder from Hernád

The feeder is used to feed broiler. The average throughput of the feeder is 1,76 tons/hour for the whole day operation. The average value of the fodder loss is 4,57%, it is higher than with other trough type feeders.

The reliability is  $K_4 = 0,98$ . The machine is operated very simply, it can be operated by the husbandman. The machine is good for poultry feeding from an age of 14 days, supposing that the proposed modifications would be carried out.

Main technical data:

- tank capacity: 270 dm<sup>3</sup>
- length of delivery chain: 160 m
- speed of delivery chain: 15 m/min
- width of feeding trough: 91 mm
- depth of feeding trough: 70 mm



Manufacturer: ASA-LIFT A/S, Denmark  
Test No: 466.

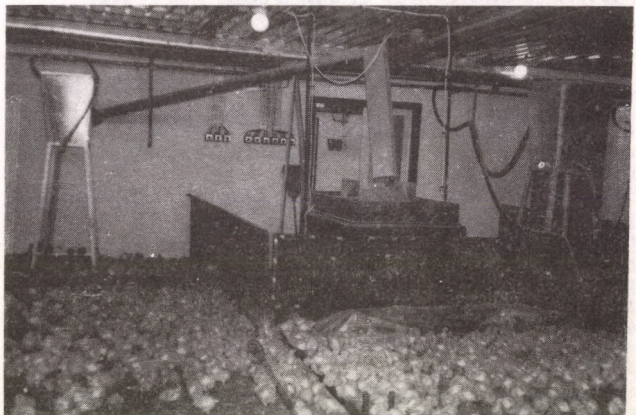
## PASREFORM Atlas S-19 pre-hatcher and H2-15 incubator

The machines do not have wooden parts, their life is long. The maximum temperature difference between the different point of the machine - depending on the position of the trays - was found to be 0,4 to 0,8 °Celsius. The mentioned temperature difference did not cause problem. Constant temperature was maintained by the control system of the machine, depending on the set value. The functional performance of the machine was good.

Seven experiment series were performed: the result was 68,6% for all of the eggs put in the machine and it was 72,4% for fertile eggs.

Main technical data:

- no. of eggs to be installed: 16,800 pcs
- no. of trolleys: 4 units
- no. of egg trays: 28 units
- no. of eggs per tray: 150 units



Manufacturer: Március 15 MgTSz, Hernád, Hungary  
Test No: 472.



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### Unirak-800 front loader (akid steering)

The machine can be used to remove manure from corrals and sheds with deep bedding system and for loading operations in granaries. The reliability of the machine is satisfactory.

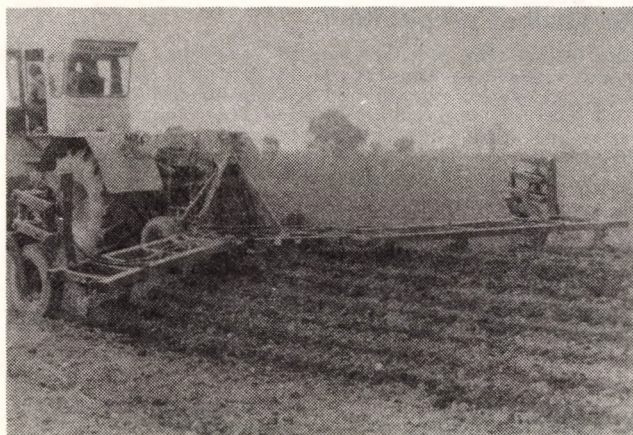
Under average operating conditions, the machine's loading performance during normal operating periods was 60-80 tons per hour while loading bulk materials; its fuel consumption per engine service hour was found to be 5.5-5.8 kg per hour.

Main technical data:

- lift force:	8,0 kN
- lift height /maximum/:	2920 mm
- track:	1440 mm
- wheel base:	1035 mm
- engine performance:	50 kW



Manufacturer: KAPOSGÉP, Kaposvár, Hungary  
Test No.: 477.



Manufacturer: Celinogradselmash, Celinograd, USSR  
Test No.: 478.

### KPS-11 semi-mounted cultivator

The tillage tools, mounted on an articulated frame, break up and loosen the soil properly while cutting the roots of the plants as well. The energy requirements of the full-width and the reduced-width versions vary on a wide scale /130-200 kW/ which can be attached to different types of tractors in the speed range of 4-8 km.h<sup>-1</sup>. The reliability of the unit is good /at  $K_4 = 0.98$ /. Operated with a K-701 tractor, it works with a 4.2 ha.h<sup>-1</sup> performance per service hour if used for stubble stripping. The cultivator can be used equally well on loose and medium-hard soils for stubble stripping and initial cultivation without plowing.

Main technical data:

- working width:	9,9 m
- working depth:	25 cm
- number of tines:	11

### RÁBA-VF-TJ-6 plough of variable width

RÁBA-VF-TJ-6, a variable width plough, was developed for plowing tractors by the RÁBA Agricultural Machinery Factory of Mosonmagyaróvár. The medium-deep plough did rather well both with its minimum and its maximum working width, breaking up and turning over soil after stubble stripping, at a working depth of 24-27 cm. From an energy-related point of view, it can be linked to tractors with an engine capacity of 180-200 kW, operating in a speed range between 6-10 km.h<sup>-1</sup>. Its reliability is good /at  $K_4 = 0.98$ /. If operated with a RÁBA-Steiger tractor, its performance per service hour is 1.22 ha.h<sup>-1</sup>. It can be used very well to plough soils with different hardness to a medium depth.

Main technical data:

- working width:	1,8-3,0 m
- number of plough bottoms:	6
- width of the bottom:	30-50 cm
- chassis height:	870 mm



Manufacturer: RÁBA MMG Mosonmagyaróvár, Hungary  
Test No.: 479.



# AGROMACHTEST

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## X-KT-3,8 towed harrow disk

As proven by the work quality parameters identified in the course of tests conducted on arable lands and in orchards, surface finishing by the machine is especially good, due primarily to the disk overlap. It can be linked very well to tractors with a hauling capacity of 20-25 kW /MTZ, Zetor/ in the working speed range of 4-8 km.h<sup>-1</sup>. Its reliability is good /at K<sub>4</sub> = 0.98/. When operated with an MTZ-80 tractor, it operates with a 2.0 ha.h<sup>-1</sup> performance per service hour in stubble stripping. It can be used for stubble stripping, surface finishing and soil cultivation of light and medium-hard, but easy-to-cultivate, soils.

Main technical data:

- working width: 3,8 m
- number of harrow rows: 2
- angle of the harrow rows: 10°, 15° and 20°
- disk diameter: 560 mm



Manufacturer: RÁBA MMG, Mosonmagyaróvár, Hungary  
Test No.: 481.

## Kongskilde Germinator SP-7000 machine for seedbed preparation

The Germinator SP-7000 hauled seed-bed finisher is manufactured by Kongskilde of Denmark. The machine, made up of two types of spring-loaded cultivators and cylinder harrows, has excellent loosening, surface finishing and mixing effect. In the 8-12 km.h<sup>-1</sup> speed range a 130-140 kW capacity tractor is required to operate the machine.

Its reliability is good /at K<sub>4</sub> = 0.98/. The area performance of the seed-bed finisher per service hour, operated with a RÁBA-250 tractor, is expected to be around 5.2 ha.h<sup>-1</sup>. The seed-bed finisher, complete with a working depth regulator of novel design intended to facilitate precise control of working depth, can be put to good use under Hungarian conditions as well.

Main technical data:

- working width: 7,0 m
- number of tines: 7
- working depth: 8-12 cm
- mass: 2500 kg



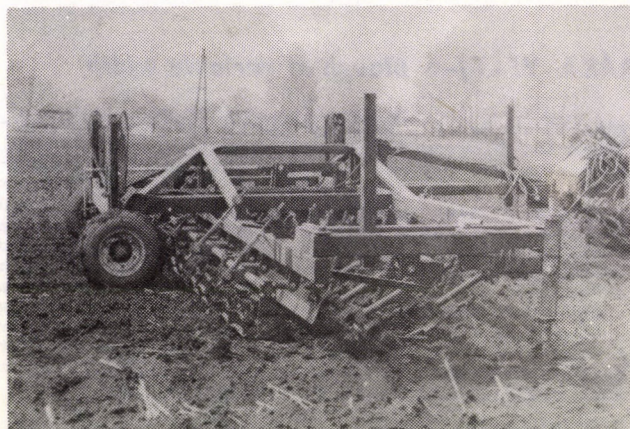
Manufacturer: Kongskilde A/S, Soro, Denmark  
Test No.: 482.

## KRM-8,4 machine for seedbed preparation

The machine, made up of soil-driven star-wheels, a finishing unit and cylinder harrow, has a good loosening, finishing, mixing and weed-killing effect. It can be operated on imperfectly cultivated stubble fields of sunflower and corn without being clogged. In the 8-14 km.h<sup>-1</sup> speed range a 180 kW capacity tractor is required for the operation of the machine. Its reliability is good /at K<sub>4</sub> = 0.98/. The area performance of the seed-bed finisher per service hour, operated by a RÁBA-250 tractor, is expected to be around 5.5 ha.h<sup>-1</sup>. The rotary seed-bed finisher can be applied well on soils with varying hardness under different conditions.

Main technical data:

- working width: 8,4 m
- working depth: 12 cm
- number of tines: 27
- mass: 4200 kg



Manufacturer: AGRIKON, Kecskemét, Hungary  
Test No.: 483.



# AGROMACHTEST

NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING (MÉMMI)  
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## Beinlich M-3000 irrigation system

The equipment is suitable to provide overhead irrigation for arable land crops. The cubic flow in the equipment is between 40-130 cu.m.h<sup>-1</sup>. The withdrawal speed of the irrigation head can be adjusted without grades. The reliability of the unit is excellent /at K<sub>4</sub> = 0.99/. Its performance during the total working time was W<sub>03</sub> = 100.3 cu.m. h<sup>-1</sup>.

The equipment is suitable to provide overhead irrigation for arable land and horticultural crops.

Main technical data:

- pipeline: diameter 125 mm
- length 450 m
- operating pressure: 8 - 10 bar
- waterflow 40 - 130 m<sup>3</sup>/h
- irrigated area: 3- 4 hectares



Manufacturer: BEINLICH GmbH, FRG  
Test No.: 484.



Manufacturer: VALMONT Inc., USA  
Test No.: 485.

## Valmont 6000 irrigation system

The equipment can be used to provide overhead irrigation for low and high crops. The cubic flow of the equipment is 876 cu.m.h<sup>-1</sup>. The required volume of irrigation water can be provided by appropriately adjusting the speed of the equipment. The reliability of the unit is good /at K<sub>4</sub> = 1/; its performance for the total of working hours W<sub>03</sub> = 632.02 cu.m.h<sup>-1</sup>. The equipment can be used to irrigate large plots of regular shape.

Main technical data:

- working width: 998 m
- forward speed: 0,6-119 m/h
- operating pressure: 3,45 bar
- waterflow: 1300 m<sup>3</sup>/h
- engine performance 219 kW

## Lindsay „ZIMMATIC G2” irrigation system

The equipment is suitable for distributing irrigation water snile moving along the plot. The cubic flow of the unit is 600 cu.m.h<sup>-1</sup>; the required volume of irrigation water can be provided by appropriately adjusting the speed of the unit. The reliability of the equipment is satisfactory /at K<sub>4</sub> = 0.97/; its performance for the total working time was W<sub>03</sub> = 533.3 cu.m.h<sup>-1</sup>. The equipment can be used to provide overhead irrigation for large plots of regular shape.

Main technical data:

- working width: 830 m
- forward speed: 0,5-108 m/h
- operating pressure : 2,5 bar
- waterflow: 600 m<sup>3</sup>/h



Manufacturer: LINDSAY Inc., USA  
Test No.: 490.



## AGROMACHTEST

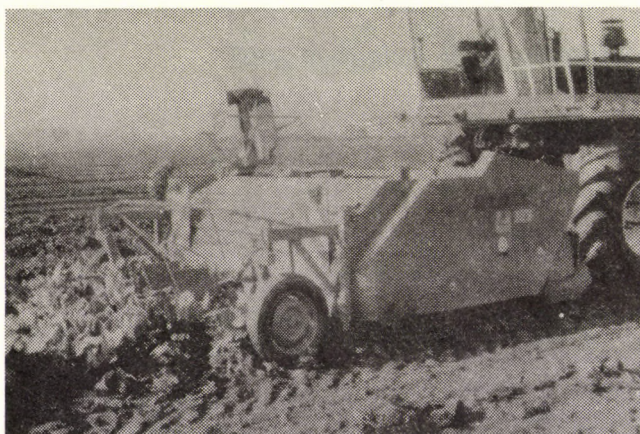
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### **KLEINE KR-6 II. sugar beet picker/loader**

The 6-row harvester has a working width of 2.7 m. The work quality, performance and operating parameters of the machine are appropriate, satisfying practical requirements. The area performance of the unit is 8-10 ha per shift. If supplemented by an appropriate windrow pick-up loader /eg.: the Kleine L/, it can harvest 150-200 ha of sugar beet in a season. The engine performance required by the unit is 90-110 kW.

Main technical data:

- working width: 2,7 m
- number of rows: 6
- working speed: 4-6 km/h
- mass: 2400 kg



Manufacturer: W. STOLL GmbH., Lengede, FRG  
Test No.: 490.

### **Self-propelled HERRIAU AM-6 sugar beet picker/loader (modified)**

The upgraded version of the Herriau AM-6 mobile sugar beet topper-windrower, digs up sugar beet, The 6-row harvester has a working width of 2.7 m. The work quality, performance and operating parameters of the machine are appropriate, satisfying practical requirements. The area performance of the unit is 8-10 ha per shift. If supplemented by an appropriate windrow pick-up/loader. /eg.: the Herriau Super/, it can harvest 200-250 ha of sugar beet in a season. The built-in engine performance of the mobile unit is 108 kW.

Main technical data:

- working width: 2,7 m
- number of rows: 6
- engine performance: 108 kW
- mass: 9680 kg



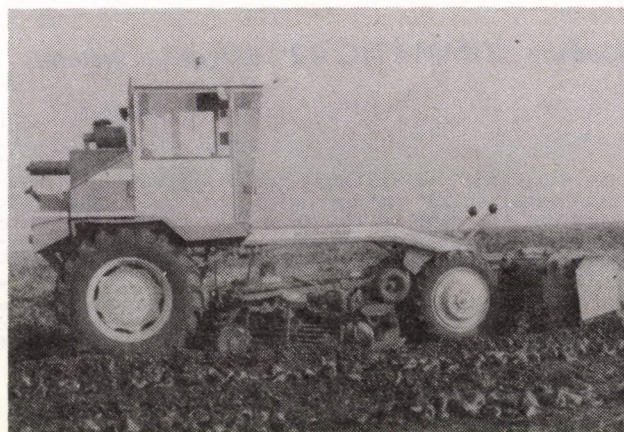
Manufacturer: KLEINE GmbH/Co., Salzkotten, FRG  
Test No.: 489.

### **STOLL MRG-6 sugar beet picker/loader (operated by Steyr 8320 tractor)**

The 6-row harvester has a working width of 2.7 m. The work quality, performance and operating parameters of the machine are appropriate, satisfying practical requirements. The performance of the machine can be characterised by 50-70% of standard quality topping, 20-25% of root damage and approximately 2% of harvesting loss. The area performance of the unit is 8-10 ha per shift; in a season it can harvest 150-200 ha of sugar beet. The engine capacity requirement of the equipment is 90-110 kW.

Main technical data:

- working width: 2,7 m
- number of rows: 6
- working speed: 5-7 km/h
- mass: 2300 kg



Manufacturer: HERRIAU S. A: Cambrai, France  
Test No.: 491.



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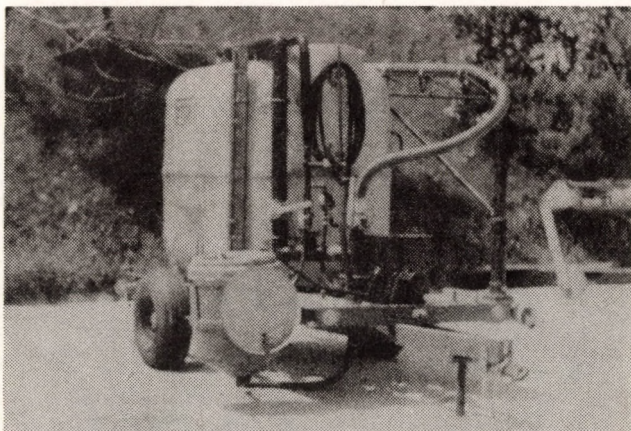
## PEMIX-1004 sprayer mixer

The plant protection chemical is mixed into the water over 1.5 minutes. The quality of the spraying liquid, produced with the machine, is satisfactory, the changes in concentration are within the + 5% tolerance allowable in agro-technological specifications. The maximum delivery of the pump is 1,200 cu.dm/min at a pressure of 0.25 MPa, the filling intensity of the equipment satisfies practical requirements.

The spraying liquid mixing capacity of the equipment is 3 cu.m/h. The reliability of the unit is good /at  $K_4 = 0.99$ /. The equipment can be used very well to produce spraying liquid for sprayers applied on arable lands and in orchards.

### Main technical data:

- tank capacity: 4000 dm<sup>3</sup>
- pump flowrate: 1200 dm<sup>3</sup>/min
- pump pressure: 0,25 MPa



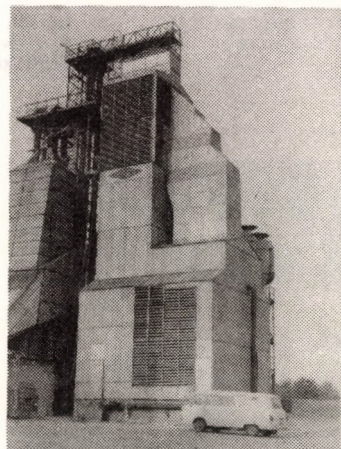
Manufacturer: ROBIX, Veszprém, Hungary  
Test No.: 494.

## BERICO 1260-CEG-SA-R grain dreyr

Under average conditions, the water evaporating capacity of the unit is 3,700 kg/h. The performance of the unit, identified in the course of the tests conducted, was 13-14,5 t/h of dried corn. The gas consumption of the unit is 260-390 cu.m/h. The average thermal energy consumption of the unit is 3.5 MJ/kg of water while the electricity consumption of the unit is 0.04 MJ/kg of water.

### Main technical data:

- capacity: 51,5 tons
- dryer bin height: 23,6 m
- electricity requirement: 164 kW



Manufacturer: BEHLEN Co., USA  
Test no.: 495



# AGROMACHTEST

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## MONEX 75/700 soybean extruder

The MONEX 75/700 extruder, can be used primarily to extrude soya. The extruder produces its thermal effect with supplementary electrical heating.

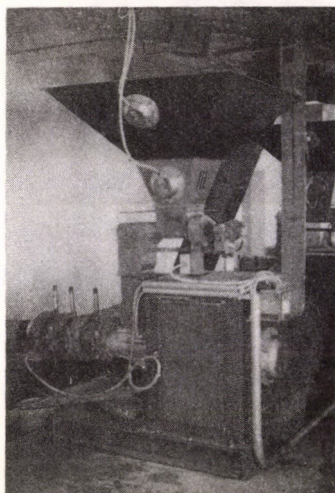
The operating performance of the equipment varied between 817-1,025 kg/h.

The toasting effect of the equipment was found to be satisfactory at a capacity of 900 kg/h and at material temperatures above 135 °C. The energy consumption was 81.7 kWh/t. When extruding corn germs, the capacity of the unit was 900 kg/h, while it was 600 kg/h when processing corn kernels. The energy consumption was 83.3 and 114 kWh/t, respectively.

The structure of the processed products was found to be favourable.

Main technical data:

- driving performance: 75 kW
- heating performance: 5,2 kW
- mass 1780 kg



Manufacturer: Monori Állami Gazdaság /  
Monor, Hungary  
Test no.: 496

## BOCCHI LE 25/30 grain flake producer

The grain flake producing unit, can be used favourably to process grains both hydrothermally and mechanically.

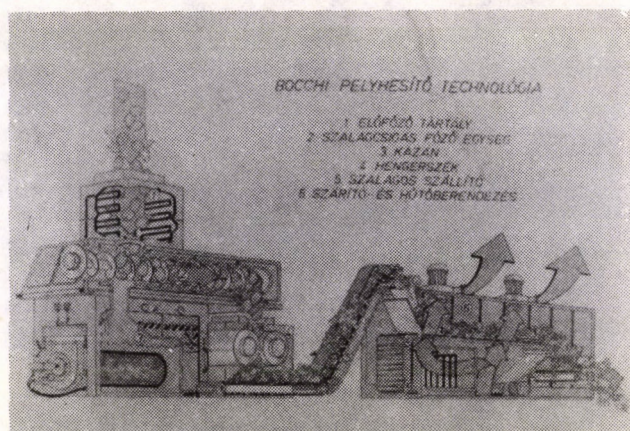
In the course of the tests, the unit was used to process horse beans, soya, corn, wheat and peas.

The capacity of the unit varied between 1.4-3 t/h, subject to the type of grain processed and the processing technology.

Energy consumption was found to be the most favourable when processing horse beans, at 503 MJ/t. The energy required for soya processing was 1,062 MJ/t. The structure of the flakes in the finished product and feed conversion were both favourable.

Main technical data:

- gas nozzle performance: 525-1050 kW
- boiler capacity: 5,2 m<sup>3</sup>
- electricity requirement: 65 kW



Manufacturer: BOCCHI, Cremona, Italy  
Test no.: 497



## AGROMACHTEST

NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING (MÉMMI)

H-2101 Gödöllő, Tessedik S. u. 4.

### IS-2500 infra heater

If appropriate gas pressure is guaranteed in the gas mains, the equipment can produce the nominal 2.5 kW of thermal output.

The 30 units of gas heaters, installed into a poultry shed with an overall area of 1,080 sq.m, could cover the heat requirement of the shed over the test period with 24% of reserves.

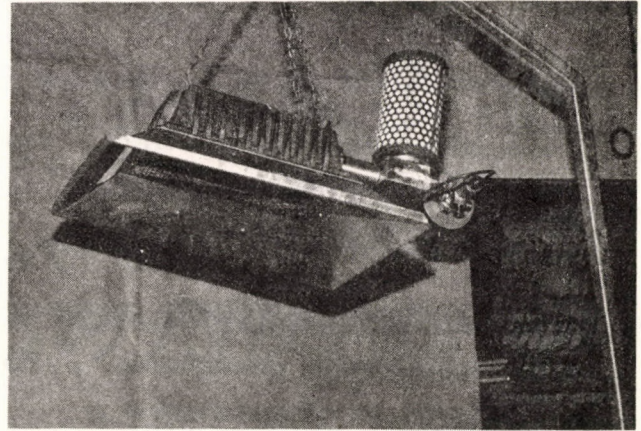
As compared to the control building, no substantial difference was found between their relative internal climatic parameters. The operating parameters of the unit are good. No break-down was noted.

As compared to traditional gas heaters, 36.2% of savings could be achieved with the use of the infra heaters.

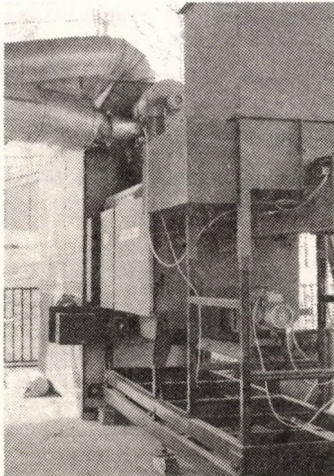
Based on the foregoing one may state that gas-fuelled infra heaters have an advantage over traditional heating units as regards work quality, energy consumption and profitability.

Main technical data:

- heating capacity: 2500 W
- gas pressure: 24,5 mbar



Manufacturer: DELTA, Tatabánya, Hungary  
Test no.: 498



Manufacturer: HUNGAROTHERM, Örményes, Hungary  
Test no.: 499

### BIOFLAMM SRB-8 furnace adapter

The unit can be used to burn off assorted chopped agricultural by-products /such as wood chipping, sunflower, rice shells/ and other pelleted fuels /such as vbiopellet/. The unit can be attached to different heat utilisation equipment /hot air blowers, furnaces/. The thermal capacity of the unit is 750 kW, its efficiency is 70-80%.

The fuelgas composition of the unit satisfies the relevant environmental regulations. The reliability of the unit is good, it can be easily operated with appropriate skills.

Main technical data:

- heating capacity: 750 kW
- electricity requirement: 7,6 kW

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