

ØYJORD PLOT DRILLS

HISTORICAL REVIEW

WITH

QUOTATIONS FROM REPORTS

EGIL ØYJORD

Acknowledgement

- **The History of Øyjord Plot Drills would not have been presented in such an excellent way without the work of Torbjorn Leuchovius.**
- **Torbjorn became Executive Secretary of IAMFE and Director of the International IAMFE Centre at the Swedish University of Agricultural Sciences in 1993.**
- **Upon his own wishes, he resigned after IAMFE / RUSSIA in 2004.**
- **Fortunately, Torbjorn has continued as Editor of IAMFE News and Webmaster for IAMFE.**
- **I am very grateful for the work of Torbjorn Leuchovius.**

Egil Øyjord

Øyjord plot drills

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1. Development history

- **Winter 1957/58:** Research assistant Egil Øyjord, Landbruksteknisk institutt, Ås, Norway, designed a 10-row plot drill for front mounting on Agria two-wheel tractor.
- **Winter 1958/59:** Egil Øyjord designed a 4-row and a 6-row plot drill. These two drills were exhibited at the Agricultural Jubilee Exhibition, Ekeberg, Oslo, 1959.
- **Winter 1959/60:** Egil Øyjord improved his designs of a 4-row and a 10-row plot drill.
- **Spring 1960:** The 4-row and the 10-row drill were tested at the State Research Farm Møystad, Hedmark. Please read the Norwegian statements in chapter 9.
- **Winter 1960/61:** Production of a series of 20 drills with 10-rows and a series of 5 drills with 5-rows at Jens A. Schou Mek. Verksted, Drøbak. These drills were delivered to research institutes at NLH/UMB and research stations all over Norway.
- **1964:** "NATO Advanced Study Institute on Mechanization of Field Experiments" was organized in Norway. The "International Association on Mechanization of Field Experiments (IAMFE) was founded.
- IAMFE had its International Centre at the Norwegian Institute of Agricultural Engineering (LTI) from 1964 to 1993, when it was moved to Sweden and Torbjørn Leuchovius, Swedish University of Agricultural Sciences, Uppsala, became Executive Secretary and Director of the International IAMFE Centre.
- **1966-1976:** Øyjord established and managed the Oyjord Research Laboratory at Jens A. Schou Mek. Verksted, where he designed many new models of his plot drills.
- **Since 1964** International and Regional IAMFE Conferences with Exhibitions and Demonstrations has been organized all over the world. These events have had a great impact on development and sale of plot research equipment from all manufacturers.
- **The plot drills from Norway were exported to 57 countries, worldwide.**

1. Development history (cont.)

- Professor emeritus Egil Øyjord, Norwegian University of Life Sciences (UMB) has compiled this historical review.
- On August 20th 1970, I demonstrated my self-propelled plot drill to the Nobel Peace Prize Winner 1970, Dr. Norman E. Borlaug.
- In a letter dated November 13, 1970, Dr. Borlaug wrote to me: *"It will be a pleasure to work with you and IAMFE in the furtherance of the green revolution"*.
- In a statement of December 22, 1970, Dr. Borlaug wrote: *"The small plot seeders have been very helpful in increasing the reliability of experimental results in India, Tunisia, Lebanon, etc"*.
- These words from Dr. Borlaug have been a very great inspiration for my work since 1970.
- In order to promote the versatility of Øyjord plot drills from Jens A. Schou Mek. Verksted, I paid for the moulds needed for casting of the Øyjord self-cleaning distributors with interchangeable distributor heads for seeds and fertilizers (The first in the world).
- The demand for Schou's main product; "Gjerdes carpenters saw" increased in the 1970's, and Schou needed the whole factory for production of these saws.
- In 1974-76, I transferred the production of my plot drills to the Wintersteiger factory in Austria.
- Royalties from the production of my plot drills gave me a better financial basis for securing the future of IAMFE.
- Please read the enclosed quotations of letters about the worldwide impact.

2. Plot drills for front mounting on Agria 1700 two-wheel tractor



The first Øyjord plot drill for Agria 1700 two-wheel tractor was designed in the winter 1957/58.

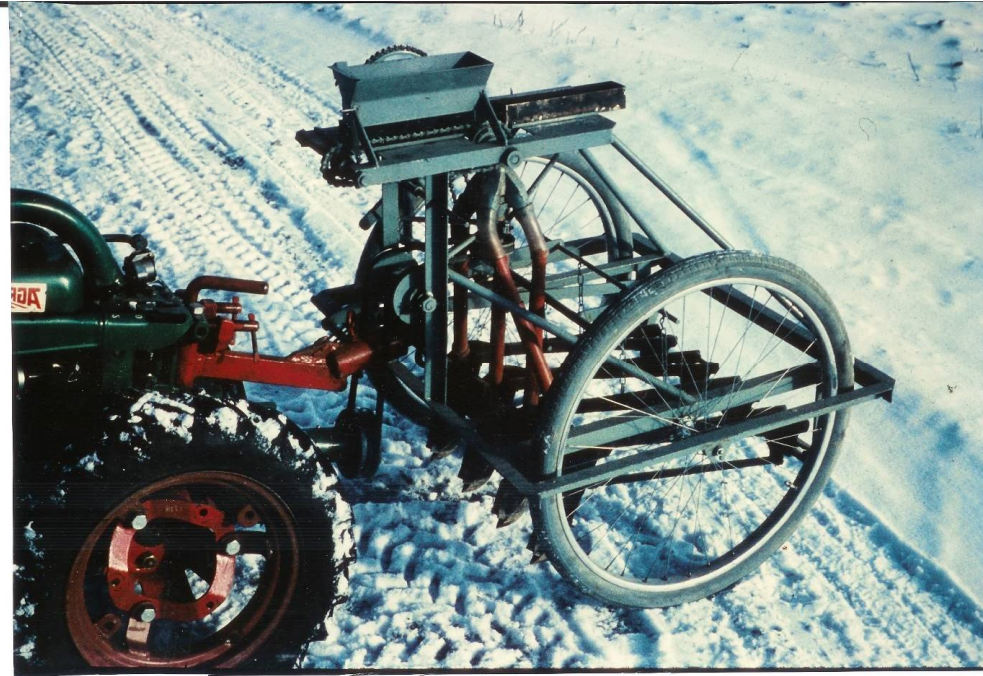
Øyjord was employed as research assistant in the "Committee on Mechanization of Field Experiments", appointed by the Council of Agricultural Research.

Øyjord got his workplaces at LTI and Institute of plant sciences, NLH/UMB, Ås, Norway.

Vollebekk experimental farm, Institute of plant sciences, NLH/UMB, Ås, started to use this drill in the spring of 1958. It multiplied the capacity in planting of field experiments in cereals.

This drill, front mounted on Agria 1700 two-wheel tractor, is in the collection of the Agricultural museum at "Norwegian University of Life Sciences (UMB)".

2. Plot drills for front mounting on Agria two-wheel tractor, cont.



In 1958/59 Øyjord designed this 4-row plot drill for front mounting on Agria 1700 two-wheel tractor.

The drill was designed for non-stop automatic feeding of seeds from magazines.

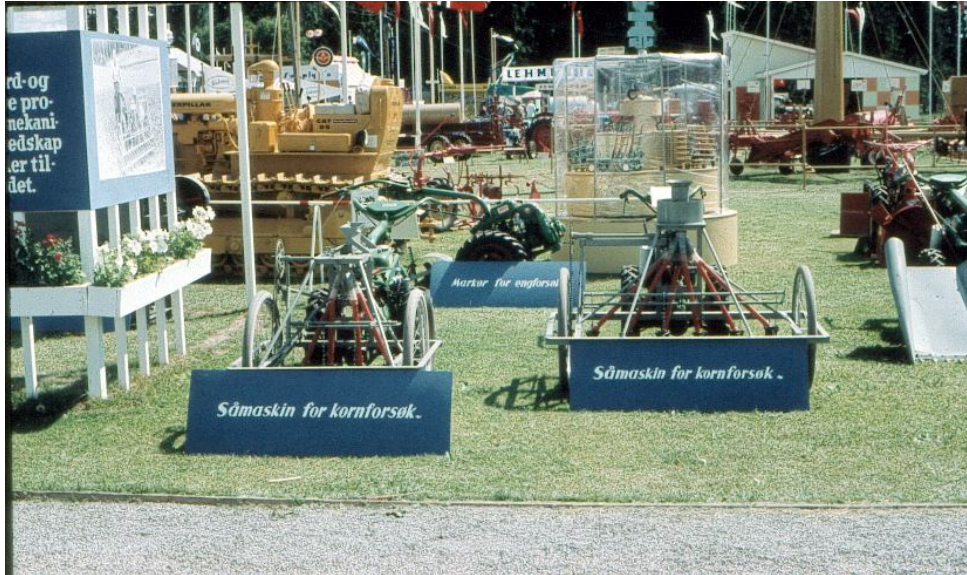
No-one showed interest for such high capacity, so the drill was half-automatic operated when used in cereal breeding trials at Voll research farm, Trondheim, from 1960 to 1977.

The capacity when planting experiments in cereals increased 10 times.

In 1977, Voll bought a 2 x 4 row Øyjord tractor mounted plot drill from Wintersteiger, Austria. The capacity was then increased 20 times.

This Øyjord 4-row plot drill, model 1958/59, is in the collection of the Norwegian agricultural museum, UMB, Ås.

2. Plot drills for front mounting on Agria two-wheel tractor, cont.



Øyjord 4-and 6-row plot drills, models 1958/59, were exhibited at the great Agricultural Jubilee Exhibition at Ekeberg, Oslo, 1959.

Responsible for this stand was the "Committee on Mechanization of Field Experiments" appointed by The Agricultural Research Council.

The 4-row drill was designed for small plant breeding plots. It was used by the plant breeders of Institute of plant sciences at Vollebekk resears farm, NLH/UMB untill it was sent to the State research farm, Voll, Trondheim where it was used from 1960.

The 6-row drill was designed for the State seed testing station, now "Spiren" at Ås. It was first used in spring 1959, 52 years ago. The Danish seed control station ordered and used the same model from 1960.

Plot drills for front mounting on Agria two-wheel tractor, cont.



Øyjord 10-row plot drill, model 1959/60.

This prototype was used at the State experimental farm, Møystad, Hedmark in spring 1960. Read the quotations in chapter 10, under Norway.

This new drill increased the planting capacity 10 times.

Two persons could plant 80-100 plots (10 m²) per hour. Agria replaced also the use of horses on the farm.

In the winter 1960/61 this 10-row plot drill was used as a model for production of a serie of 20 drills at Jens A. Schou Mek. Verksted. Later on, several series were built of this model.

In the spring 1961 these drills were delivered to plant breeding institutes at NLH and to experimental farms in Norway and Denmark. This picture was taken in front of the earlier Institute of genetic and plant breeding at Norderås, NLH/UMB, spring 1962.

This prototype is in the collection of research machinery and equipment at the Agricultural museum , UMB, Ås, Norway.

2. Plot drills for front mounting on Agria two-wheel tractor, cont.



The first 4-row Øyjord plot drill, model 1960, was used at Møystad experimental farm, Norway, in spring 1960.

The first serie of 5 drills was manufactured by Jens A. Schou Mek. Verksted in the winter of 1960/61.

These drills replaced Pracner

By using Y-units for coupling of 2 seed tubes in the same coulter. the drill can be used as a 2-row drill as you see in this picture.

The capacity of planting breeding material increased 10 times

The prototype of this drill is in the collection of the Agricultural museum, UMB, Ås, Norway.

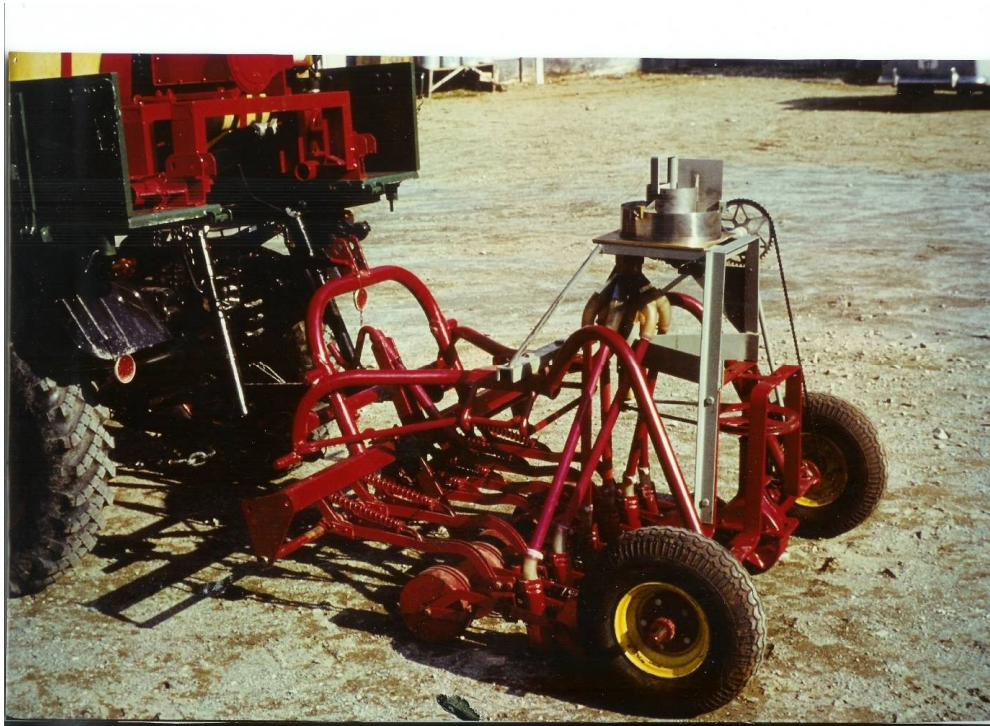
2. Plot drills for front mounting on Agraria two-wheel tractor, cont.



With a seat on Agraria 1700 two-wheel tractor an old Øyjord plot drill was upgraded for non-stop drilling of plots.

This doubled the capacity.

3. Plot drills for mounting on four-wheel tractors



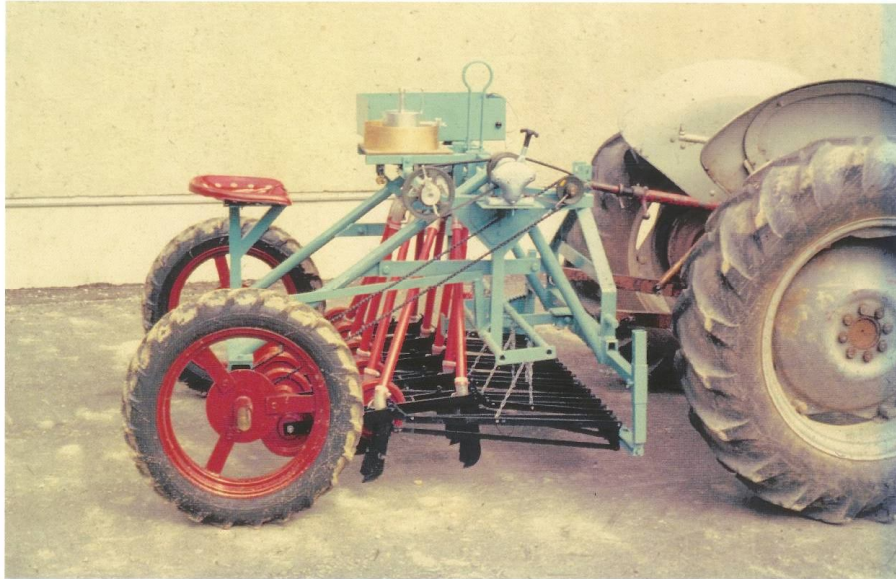
The first Øyjord tractor mounted plot drill was designed at LTI, Ås, Norway in 1962.

It was built on a modified frame from a Stokland farm drill.

The first drills of this type was manufactured by Jens A. Schou Mek. Verksted in 1962/63.

From 1967 the Øyjord tractor mounted plot drills were delivered with the Øyjord frames.

3. Plot drills for mounting on four-wheel tractors, cont.



Øyjord 10-row tractor mounted plot drill model 1967 with the Øyjord frame.

This model with electrically driven seed distributor was developed in Øyjord research laboratory at Jens A. Schou Mek. Verksted in 1967.

In 1968, a plot drill with mechanical driven seed distributor was developed in Øyjord research laboratory.

The capacity of tractor mounted models is 75-100 plots of 10 m², per hour with stops between plots and 150- 200 plots per hour without stops between plots.

The Øyjord tractor mounted plot drills became very popular. They were exported to all continents of the world.

These plot drills were produced by Jens. A. Schou Mek. Verksted up to 1976 when Øyjord transferred the production from Schou in Norway to Wintersteiger in Austria.

3. Plot drills for mounting on four-wheel tractors, cont.



The Øyjord tractor mounted drills were further developed in the Øyjord research laboratory, Jens A. Schou Mek. Verksted, Drøbak, Norway.

These drills have been used by local experimental associations and on experimental stations in Norway since the late 1960's.

Several hundred drills were exported all over the world.

This photo show planting of a variety testing experiment at Institute of plant sciences, NLH/UMB. Ås, Norway, spring 1971.

The tractor driver is Professor Kåre Ringlund, NLH/UMB. Operator on the drill is Professor Ev. Everson, Michigan State University, USA. Standing behind, Assoc. Prof. Karl Mikkelsen, NLH/UMB.

In the background you can see the roof of the tower building of UMB Ås, Norway.

3. Plot drills for mounting on four-wheel tractors, cont.



The Øyjord, light frame, plot drill model 1979, for mounting on farm tractors.

This machine has been used in vegetable trials in Vestfold county, Norway.

This drill has 3 Øyjord broad band coulters with stainless steel press wheels for sowing carrots, onions and other species where it is a great advantage to spread the seed in 6.5 cm bands rather than planting in 2 cm narrow rows.

Equipped with the Øyjord "mini vertical fluted feeder" as shown in the photo, this feeder can plant carrot, salad, onion/leak, turnip and other vegetable seeds continuous on large areas..

Several plot and farm drills used for sowing of vegetable seeds in Norway are equipped with the Øyjord broad band coulters with stainless steel press wheels to avoid clogging.

3. Plot drills for mounting on four-wheel tractors, cont.



The Øyjord 2 x 4 row tractor mounted plot drill can plant two 4-row plots at the same time, and the drilling capacity is doubled. This is a great advantage in plant breeding.

This model was designed in the Øyjord research laboratory at Jens A. Schou Mek. Verksted, Drøbak.

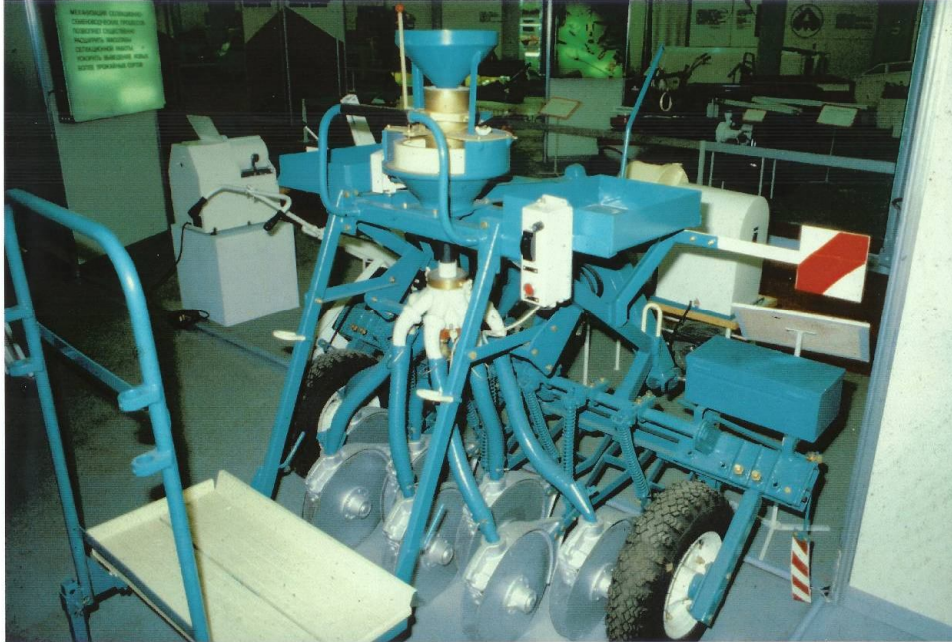
This photo was taken at Institute of plant sciences, NLH/UMB, Ås, Norway in 1974.

The drill is operated by 2 persons. With a clever operator and slow speed, it can also be operated by 1 person in addition to the tractor driver.

The capacity is approx. 350-500 plots per hour. This means 40-50 times higher capacity compared with what 3 persons could manage with a hand-pulled 5-row Pracner drill which was earlier used in plant breeding and variety trials in Norway from 1920.

Pracner plot drills were used in Norwegian plant breeding and variety trials up to 1961 when Øyjord 4-row and 10-row plot drills mounted on a two wheel tractor operated by 2 persons 10-folded the capacity compared with the old Pracner plot drills from Czechoslovakia.

3. Plot drills for mounting on four-wheel tractors, cont.



In 1967 Soviet Union purchased 20 Øyjord self-propelled plot drills from Jens A. Schou Mek. Verksted.

The following year, a delegation from Soviet Union came to Norway and asked for a delivery of another 1000 drills with 1 year delivery time.

Jens A. Schou Mek. Verksted could not meet a request of such a magnitude.

However, this triggered Jens A. Schou to enlarge his factory. The first new factory building was ready for use in 1971. In 1974 the length of this building was doubled.

Without asking Øyjord for permission to use the Øyjord inventions, Soviet Union copied the Øyjord tractor mounted plot drill and made a total of 600 plot drills for use in their country before 1989.

Please also see Chapter 10, Quotations, country Russia.

3. Plot drills for mounting on four-wheel tractors, cont.

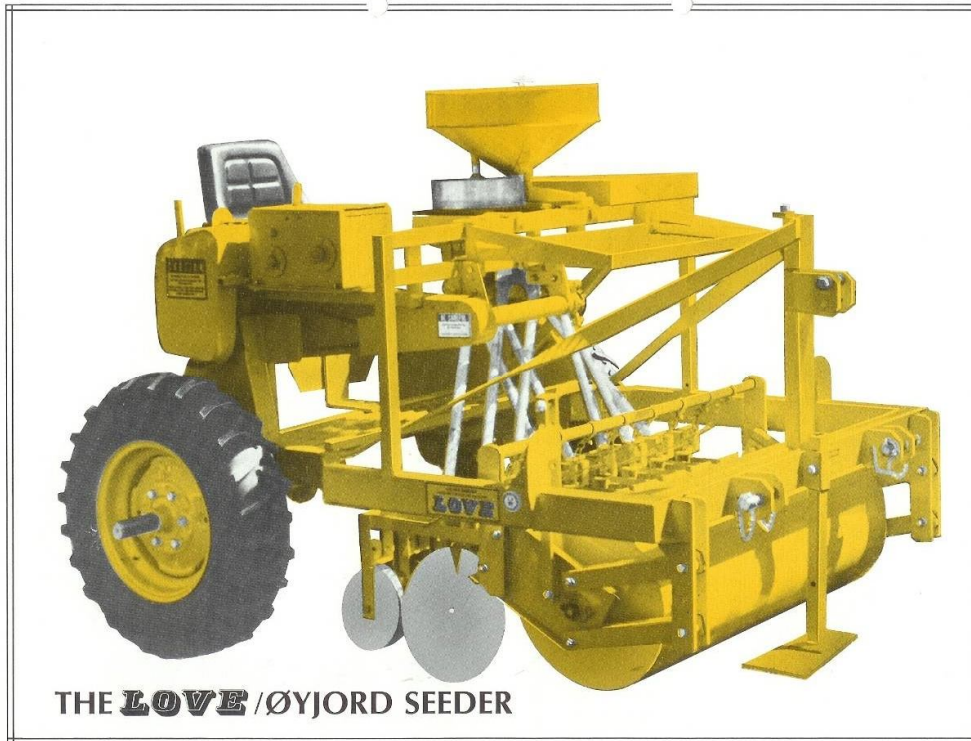


Egil Øyjord in front of a Chinese model of the Øyjord plot drill for mounting on farm tractors.

Almost 100 tractor mounted and self-propelled plot drills were made in China in 1993.

This picture was taken in the Hailongjiang Province, Nord-East China, 1993.

3. Plot drills for mounting on four-wheel tractors, cont.



Comparative testing of 3 different makes of drills for sowing of forest plant seeds was carried out in 1975-76 at USDA Forest Service, Equipment Development Center, Missoula, Montana, USA.

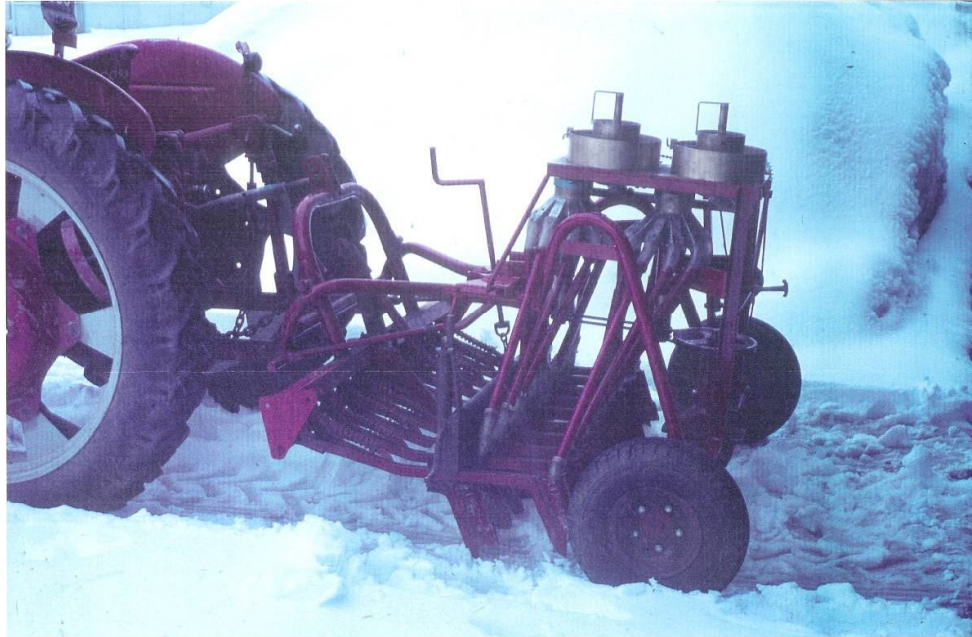
Øyjord plot drill for vegetable growers came out as a winner.

In 1976, the J.E Love Company, Garfield Washington, asked Øyjord for permission to manufacture Øyjord plot drills for forest plant nurseries in USA and Canada.

In 1977, an agreement was reached and from 1979 the J.E. Love Company, Garfield, Washington could start delivering "THE LOVE/ØYJORD SEEDER" for sowing spruce and pine seeds as well as a wide range of other seeds in forest plant nurseries.

This picture is taken from a brochure of J. E. Love Company.
For more information write Oyjord on Internet and click. Then click Love Oyjord seeder.
Those interested to see this seeder in operation, can ask for a DVD.

4. Combined plot drills for seeds and fertilizers



Øyjord designed his first plot drill for seeds and fertilizers at LTI, Ås, Norway, in 1965.

To save work it was built on a modified frame from the Norwegian Stokland drill for farmers.

The Stokland drill was manufactured by Kverneland, Jæren county, Norway

The results in field trials with fertilizers placement in rows between and approx. 2 inches deeper than the rows of seeds in field experiments at Vollebekk, NLH/UMB, Ås and in Jæren county, showed a yield increase of approx. 500 kg per hectar.

This experimental drill and the reports of the results of fertilizer placement contributed to an increased interest and purchase of combined seed and fertilizer drills in Norway.

4. Combined plot drills for seeds and fertilizers, cont.



This advanced model of Øyjord plot seeder for row placement of fertilizers was designed and tested in Norway in 1974-76.

The development was financed by NORAD - The Norwegian Agency for International Development.

This picture was taken in 1977 in the field of Institute of soil sciences, NLH/UMB, Ås, Norway.

The man to the right is the IAMFE Scholar K.K. Kaul from the Agricultural Research Institute, New Delhi, India.

In 1979 this machine was sent as a gift to the CGIAR International Center for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria.

4. Combined plot drills for seeds and fertilizers, cont.



This Øyjord tractor mounted plot drill with portion feeding of seeds into disc coulters and continuous feeding of fertilizers from a Fiona fertilizer box was designed in 1985.

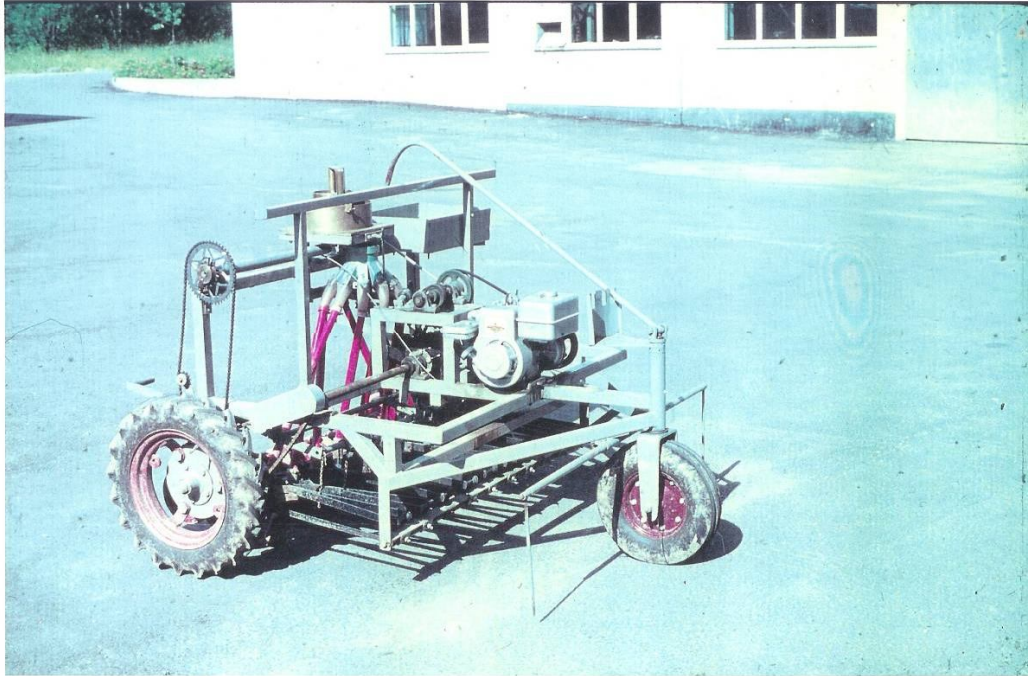
The funding came from the State Seed Control Station, today named "Spiren", Ås, Norway.

**This picture was taken
May 4, 2011**

This combined drill for seeds and fertilizers is equipped with disc coulters with precise control of the seeding depth and fertilizer coulters with a central adjustment for depth placement of fertilizers independent of adjustment of the seeding depth of the seeds.

This plot drill has been used every year during 26 years. It is a sign of good quality and performance that "Spiren" has no plans for buying a new drill for controlling the purity of seeds.

5. Self propelled plot drills



The first Øyjord self propelled plot drill, model 1962, was constructed at LTI, Norway.

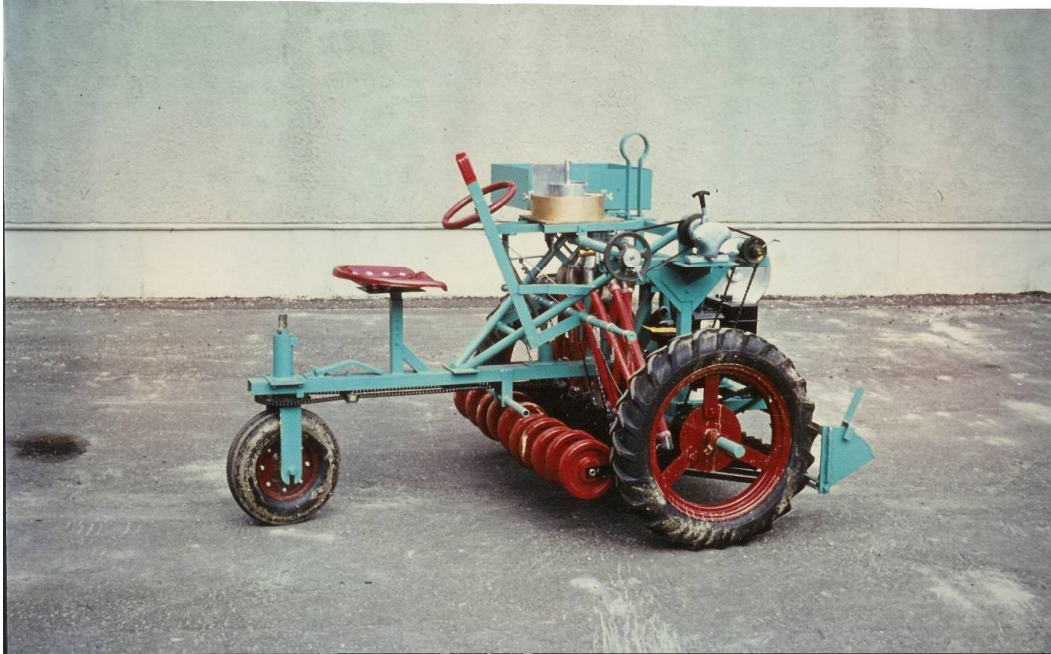
The drill was quipped with a 3 hp, Briggs & Stratton gasoline engine. a belt clutch and a differential from Tempo front platform moped made by Jonas Øgland, Sandnes, Norway.

A total of 30 drills was made by Jens A. Schou Mek. Verksted, Drøbak, Norway.

The long handle for presice steering of the front wheel from right or left side, was proposed by Chief Engineer Emil Wilberg at LTI.

Several drills were sold in Norway. A few of the drills was upgraded with a reverse gear and individual wheel breakes for easy turning..

5. Self propelled plot drills, cont.



Øyjord 10-row self propelled plot drill, model 1966, with differential and 3 hp Briggs & Stratton, gasoline engine.

During the winter 1966/67 a serie of 75 machines was produced by Jens A. Schou Mek. Verksted.

In 1967 Soviet Union ordered 20, and Sweden 10 drills from this serie.

The drill was also exported to many countries in Europe as well as to Australia, Canada, USA and India. In Norway the State research farm, Voll, Trondheim, bought one machine.

After having succesessfully used the drill, a Soviet delegation came to Norway and wished to order another 1000 drills. Upon a glance of the factory they expressed: "This factory is far to small ". No order was received.

When Jens A. Schou heard this, he started planning a large factory building.

Today this large factory has become a Super marked named: "AMFI DRØBAK CITY"

5. Self propelled plot drills, cont.



Øyjord 10- row self propelled plot drill, model 1970, with a 10 hp Briggs & Stratton motor, individual wheel brakes, a gearbox with differential and 4 gears forward and reverse.

In total, 130 of these machines were produced by Jens A. Schou Mek. Verksted. Norway, and distributed all over the world.

The production of this drill was transferred to the Wintersteiger company in Austria in 1974.

This picture from 1972 shows planting of an experimental field for variety testing of cereals at Vollebekk research farm, Institute of plant sciences, NLH/UMB, Ås, Norway.

A drill of this type is in the collection of the Agricultural museum at UMB, Ås, Norway.

5. Self propelled plot drills, cont.



Wintersteiger, Austria, produced a total 40 Øyjord self-propelled "walking type" plot drills from 1978 to 1984.

Øyjord designed this model for easy transport between farms in Norwegian "Experimental rings".

12 Experimental rings in Norway bought this drill in 1978

In total, 33 plot drills of this model are used in Norway.

This selfpropelled seeder is equipped with a 3 hp Briggs & Stratton gasoline engine and a gearbox with differential and 4 forward gears and one reverse.

From the steering handle you can break left or right wheel in order to turn, and you can easily return in the same track and save marking lines.

When stopping between plots, 1 person can plant 60 to 100 plots per hour. With a filling funnel on top of the feeder, 2 persons can plant up to 200 plots per hour without stopping between plots along the same row.

This photo shows planting in "Follo experimental ring" in spring 1978. The plot seeders from 1978 are 33 years old and are still in use. A DVD can be ordered.

5. Self propelled plot drills, cont.



In 1970 Egil Øyjord showed his self-propelled plot drill to the winner of the Nobel Peace Prize, Dr. Norman E. Borlaug.

Dr. Borlaug was the founder of "The Green Revolution" which has saved the life of a milliard of people in the world.

The Øyjord plot drills came into regular use in the research fields of the CGIAR International Centre for Maiz and Wheat Research (CIMMYT), Mexico, in the seventies.

CIMMYT is the world's most important center for breeding of corn and wheat. They use a great number of Øyjord plot drills in Mexico as well as at in other CIMMYT operated centers in the world. Please see the quotations in Chapter 10, under country Mexico.

In 1970, Dr. Borlaug, welcomed Øyjord in the work for "The Green Revolution".

I took this picture at CIMMYT, Mexico in 1979. I was invited there as a guest researcher.

5. Self propelled plot drills, cont.



This Øyjord plot drill was shipped with M/S Sunndalsfjord from Oslo to Mombasa on the 7th of September, 1972 for further transfer to Njoro, Kenya.

Please study the quotations from Kenya in Chapter 10.

Please also read the country report from Sudan about five years of experience from the use of an Øyjord tractor mounted plot drill.

In the 1970's, several Øyjord plot drills from Jens A. Schou Mek. Verksted and from Wintersteiger in Austria were sent to research organizations and projects in Kenya as well as to many other countries in Africa and in Asia.

I took this picture at Njoro Plant Breeding Station in 1982.

According to my experince, when introducing new scientific equipment, good results are only possible when the receiver/user is positive and understands the potential with the new equipment so as to fully be engaged in using it.

5. Self propelled plot drills, cont.



I took this picture during a demonstration of Øyjord self-propelled plot drill at the Second Regional IAMFE Conference and Exhibition on Mechanization of Field Experiments (IAMFE/CIAE) Bhopal, India, 1985.

By the end of the 1960's and in the beginning of the 1970's, several Øyjord plot drills made at Jens A. Schou Mek. Verksted were shipped from Oslo, Norway to Bombay, India, for further transport to the customers in India.

Read about the good experiences under Chapter 9, country India.

5. Self propelled plot drills, cont.



This Øyjord self propelled plot drill, made by Wintersteiger, Austria, came into use at Beijing Agricultural University, in 1980.

Upon an invitation from the Chinese Ministry of Agriculture, in 1983, I gave a week of lectures for Chinese researchers at a seminar on mechanization of field experiments arranged at Beijing Agricultural University- now named : China Agricultural University, West Campus, Beijing.

This visit in 1983 was the beginning of a closer cooperation between IAMFE and China, and resulted in the planning and organization of the Ninth International IAMFE Conference and Exhibition on Mechanization of Field Experiments in Beijing in 1994.- IAMFE/China '94.

At this conference I proposed the establishment of a "Chinese Branch of IAMFE". This proposal was accepted by leading representatives of the Chinese Ministry of Agriculture. Our branch in China is the most important branch of IAMFE.

This photo was taken in 1983 during my first visit in China. Please see quotations in Chapter 10, under China.

5. Self propelled plot drills, cont.



I took this picture of a Chinese model of the Øyjord plot drill, mounted on a Chinese tractor, in the North-East of China in 1993.

Based on the the Øyjord plot drill, China had made almost 100 self- propelled and tractor mounted plot drills in 1993.

5. Self propelled plot drills, cont.



I took this picture of the self-propelled Øyjord plot drill at the demonstration which was arranged at the International IAMFE/CHINA Conference in Beijing in 1994.

The Chinese models of a self-propelled and a tractor mounted plot drill were also demonstrated at this conference

In the foreground you can see an Øyjord plot drill delivered to China in 1980 by the Austrian Wintersteiger company. The famous German company, Hans-Ulrich Hege, exhibited the Hege plot drills, the Hege plot combines and other types of their plot research equipment.

All kinds of plot research machinery and equipment for field and laboratory work, were exhibited and demonstrated at this “Ninth International IAMFE Conference and Exhibition on Mechanization of Field Experiments” in Beijing in 1994.

6. Oyjord Research Laboratory and stock of spare parts at Jens A. Schou Mek. Verksted 1974



The demand for Øyjord plot drills increased dramatically after "NATO Advanced Study Institute on Mechanization of Field Experiments", arranged in Norway in 1964.

The Norwegian institute of agricultural engineering (LTI) was not able to meet my needs for help in development of new models of plot drills, so I decided to establish my own company in addition to my job at the LTI institute.

From 1966 to 1976, I operated "Oyjord Research Laboratory " for development and production of plot research equipment at Jens A. Schou Mek. Verksted, Drøbak, Norway.

The last year of Oyjord Research Laboratory I had 2000 m² floor in the Schou workshop.

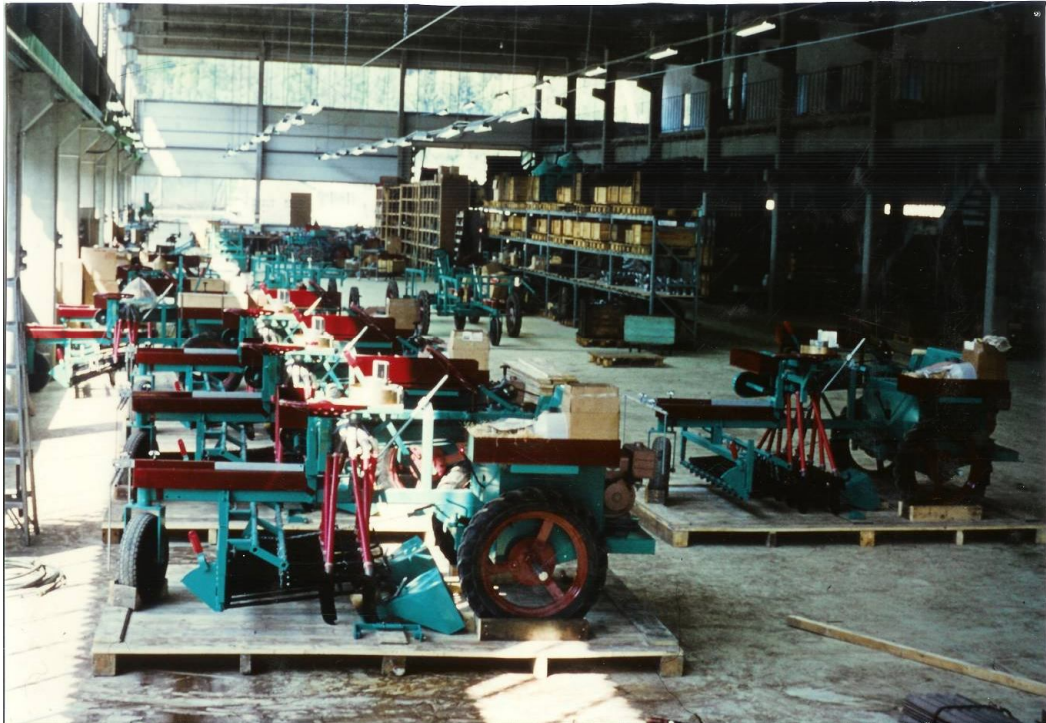
6. Oyjord Research Laboratory and stock of spare parts at Jens A. Schou Mek. Verksted, cont.



Picture from the assembly hall
in Jens A. Schou Mek Verksted,
April, 1973.

A 14-row plot drill for tractor mounting is ready packed for shipping to the Nordic-Tanzanian Agricultural Project (MARTI, MBEYA), Dar Es Salaam, Tanzania.

7. Production and sales from Jens A. Schou Mek. Verksted, Drøbak 1964-1976



The assembly hall at Jens A. Schou Mek Verksted in 1971.

This picture shows packing of 5 Øyjord self propelled plot drills.

Øyjord plot drills were exported from Jens A, Schou Mek. Verksted, Drøbak, Norway to 57 countries during the period from 1960 to 1976, when all production was transferred to the Wintersteiger company in Austria.

7. Production and sales from Jens A. Schou Mek. Verksted, Drøbak 1964-1976, cont.



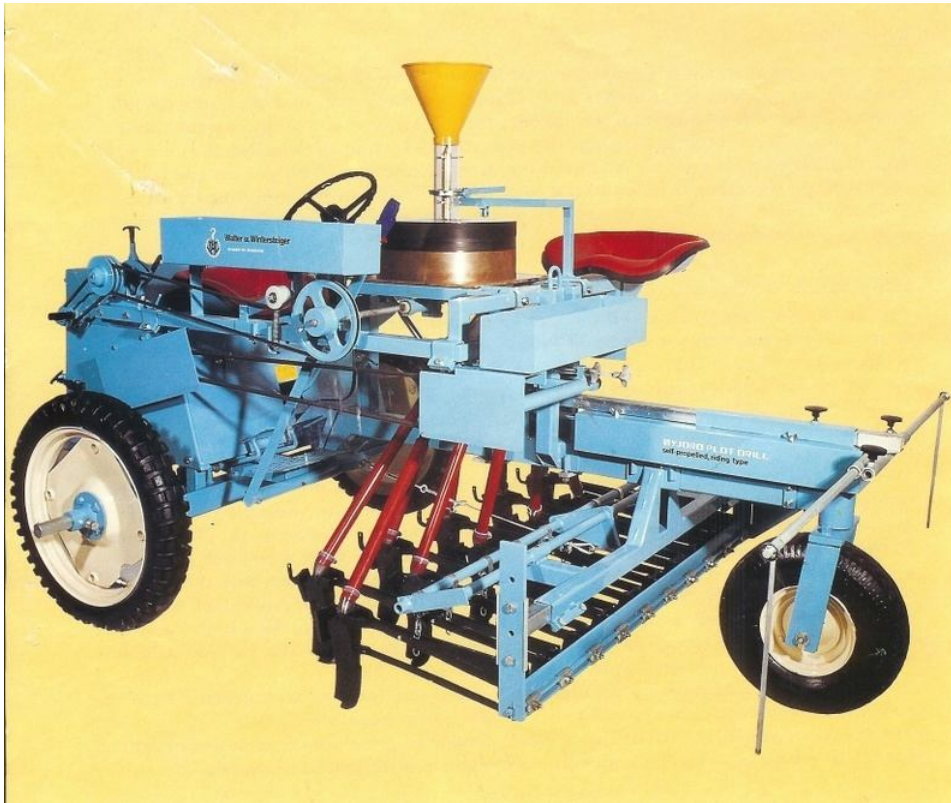
This picture shows the new factory building of Jens A. Schou Mek. Verksted, Drøbak, Norway 1971. In 1974, the length of this building was doubled.

4 Øyjord plot drills (a gift from Rockefeller Foundation, New York) is ready for transport from the factory to Oslo to be shipped by boat to Bombay and from there to the Indian Agricultural Research Institute, New Delhi, India.

The Øyjord Research Laboratory and the production of Øyjord plot drills in Jens A. Schou Mek. Verksted came to an end in 1976 when the production was transferred from Jens A. Schou Mek. Verksted to the Wintersteiger company in Austria.

In 1986, the new factory building of Jens A. Schou was re-opened as a super market named DRØBAK CITY. From 2002, the name was changed to AMFI, DRØBAK CITY.

8. Transfer of the production from Norway to Austria 1974-76



ØYJORD / WINTERSTEIGER

From 1974, Jens A. Schou Mek. Verksted needed all of the capacity at his factory for producing the "Gjerde saw for carpenters".

In 1974 the production of Øyjord self propelled plot drills was transferred from the Schou factory in Norway to the Wintersteiger factory in Ried Innkreis, Austria.

The profit from a continued good sale of Øyjord selfpropelled plot drill was used for the development of Nurserymaster plot combine.

8. Transfer of production from Norway to Austria 1974-76, cont.



PLOTMAN / ØYJORD

In 1974 Egil Øyjord and Wintersteiger made an agreement that Wintersteiger should also make a new model with 2 wheels in front.

In 1981 Wintersteiger introduced this new model of Øyjord self propelled plot drill named PLOTMAN according to a proposal of Øyjord.

The machine in the picture is equipped with 2 Øyjord feeders and mechanical distributors for sowing seed and fertilizers.

The frame to Plotman was also delivered with the "Seedmatic Six" fully automatic plot drill with magazines for sowing of breeding material from single ears of new varieties of cereals.

Plotman is equipped with battery and self starter with a key as on any car.

9. Main principles used for feeding and distribution of seeds and fertilizers in field plot research

The main feeding principle for seeds and fertilizers in field plot research is the batch type principle which can distribute a weighed quantity of seeds or fertilizers on a definite row or plot length or plot size.

A feeder of this type is the "Øyjord cell cone feeder" as used in Øyjord plot drills or copies.

Other batch type feeders are "The belted cone feeders" used by Hege and Wintersteiger.



The Øyjord seed distributor with interchangeable distributor heads was invented and published by Øyjord in Norway in 1965.

In 1968 it was internationally published at the Second IAMFE Conference in West-Germany.

Since 1974 Wintersteiger has used my invention (the first in the world) in their production. In the later years it has been presented as a Wintersteiger System.

It is my wish that Wintersteiger and others who copy my invention should give me credits by naming it " Øyjord distributor system".

10. Quotations of letters to Professor Egil Oyjord and Jens A. Schou Mek. Verksted from users of the Oyjord Plot Seeders.

(Some other statements have also been added)

Compiled by Antonio Wilson Rocha. Vilbjorg Furnes and Torunn Skedsmo

HISTORY

During the winter of 1957/58 the first Oyjord plot drill was constructed in the workshop of the Norwegian Institute of Agricultural Engineering. It came into use in spring 1958.

In 1959 Mr. Egil Oyjord began his cooperation with Mr. Jens A. Schou, the owner of Jens A. Schou Mek. Verksted, Drobak, Norway.

The production of the first series started in 1960. From 1961 to 1976 the Oyjord plot drills were exported from Norway to 57 countries all over the world. Mr. Oyjord invented and developed many new models of his tractor-mounted and self propelled plot drills in the Oyjord Research Laboratory at the Schou factory. Production continued in Norway until 1974-76, when the Wintersteiger Company, Ried, Austria, took over the production.

Since 1972 the Oyjord plot drills have been copied in USA. Later they have been copied in China, Czechoslovakia, India, Italy, Poland, Turkey, Spain and the earlier Soviet Union. They are now in use in more than 100 countries all over the world.

In 1992 it was reported that the production of plot drills had started in China and that about 80 drills/seeders, using the Oyjord system, had been made so far.

At the 11th International IAMFE Conference and Exhibition on Mechanization of Field Experiments in England (IAMFE/ AAB UK 2000) it was reported that 600 of the Oyjord type plot drills had been made in Soviet Union before 1989.

10. Quotations of letters to Professor Egil Oyjord and Jens A. Schou Mek. Verksted from users of the Oyjord Plot Seeders.

(Some other statements have also been added)

Compiled by Antonio Wilson Rocha. Vilbjorg Furnes and Torunn Skedsmo

HISTORY, cont.

In connection with the nomination of Professor Egil Oyjord for the “World Food Prize” in 2001 (US \$ 250 000), the Wintersteiger Company, in a supporting letter of February 21, 2001 wrote:

“We have sold approx 5000 drills/cell wheels in almost 100 countries all over the world.

Bearing in mind the efficiency increase from each of these drills, the indirect impact on world food production is huge.--We support the award strongly, because we are sure, that no other technical instrument put in the hands of scientists and researchers has ever contributed more to world food security and increase to food production than Egil Oyjord’s plot seeder”.

Example from the production and export from Norway:

A report from Lebanon to Øyjord (1972) stated that 2 persons in 3 hours drilled the same number of plots as 15 persons sowed by hands in 20 days and the results were better because the different varieties to be compared were drilled on the same day. This will be 400 times increase in the effiecy. See other reports from Lebanon page 42.

10. Quotations, cont.

ALGERIE

In a letter of Feb. 28, 1973 Dr. W.L. McCuistion, Wheat breeder, Cooperative Wheat Program, CIMMYT, Birmandreis B, Alger, wrote:

“...We are very pleased with this machine because of its simplicity and the fine results we have received in its use. Because of the good job that we have been able to do in seeding our screening nurseries and yield trials for research, the French technician who works with us has changed his original request for a French plot drill and now will be ordering six of your Oyjord seed drills.”

AUSTRALIA

In a letter of September 25, 1967, M. N.F. Derera, Officer in Charge and Senior Plant Breeder, North West Wheat Research Institute, Narrabri, N.S.W., wrote:

“Our Oyjord seeder is quite good.”

In a letter of December 4, 1970, M. D.B. Frappell, Senior Horticulturist, Devenport, Tasmania, wrote:

“We are very pleased with the operation of the drill and have already sown several trials with carrots, red beet, parsnips and onions.”

In a letter of September 25, 1975, Mr. J. Russell, Agronomist, Department of Agriculture, Launceston, Tasmania, wrote:

“When visiting several research stations in Britain last month, I was very impressed with you experimental seed drill and the comments of officers using it.”

10. Quotations, cont.

CANADA

In a letter of May 29, 1974, Mr. Thomas W. Crozier, Senior Technician, Ales. M. Stewart & Son Ltd, wrote:

“As you no doubt know, we have been using the Oyjord Tractor mounted Plot drill. Our cereal program is just beginning and is very small at this date. We have been very pleased with the drill’s performance for soybeans, as well as cereals.”

CHINA

During a visit in China November 1983, Dr. Qiao-Sheng Zhuang, a famous Research Professor and Wheat Breeder, Institute of Crop Breeding and Cultivation, Chinese Academy of Agricultural Sciences stated to Mr. Oyjord:

“Of all plot research equipment I have been most pleased with your drill.”

On a visit of April 17, 1993, Professor Qiao repeated the same statement to Mr. Oyjord.

CYPRUS

In a letter of March 15, 1983 Mr. A. Hadjichristodoulou, Agricultural Research Institute, Nicosia, wrote:

“We are using two tractor mounted and one self propelled plot drills for sowing cereals, forage crops and food legumes. The results are excellent; sowing is done timely and accurately. Without these drills, it would have been impossible to expand our programme.”

10. Quotations, cont.

DENMARK

In a letter of August 17, 1960 M. H.C. Baekgaard, Director, Statsfrokontrollen, Copenhagen, wrote (translation):

“Based on our experience, we can as a conclusion express our full satisfaction with its suitability for our purpose. It has saved labour to a high degree and has shown extremely good performance regarding the quality of sowing.”

In a letter of March 23, 1962 Mr. Jorgen Moller, Plant Breeder of A/S Trifolium, Fro’s Plant Breeding Divisions, Research Station Taastrupgaard, Taastrup, wrote (translation):

“After using the drills for sowing of cereals, peas, grasses and clover this spring at our two experimental stations, I will state that we have been very pleased with them. The drills have been easy to operate, and they have worked well and precise.”

FED. REP. OF GERMANY

In a letter of May 13, 1972 Dr. Martin Schnock, Asgrow G.m.b.H. Ebnet b. Freiburg, Wildbachweg 11, wrote:

“...We would like to inform you that we used the drill for sowing onions, spinach, carrots, flax, wheat, mustard, peas and cabbage-seed with best success.”

“...On the whole we are very content and our sowing costs could be lowered.”

In a letter of May 24, 1972 Kartoffelzucht. Böhm, Inh. Gebr. Böhm K., Trauen, wrote:

“...Beide Maschinen haben zu unserer vollen Zufriedenheit exakt und einwandfrei gearbeitet.”

Translation:

“...Both machines have performed to our full satisfaction with exact and trouble-free operation.”

10. Quotations, cont.

FRANCE

In a letter of June 3, 1971 M. B. Linais, Director of Institut Technique des Céréales et des Fourrages, I.T.C.F., Paris, wrote:

J'ai déjà eu le plaisir de correspondre avec vous en 1966 et 1967 au sujet du "semoir experimental: que vous aviez réalisé.

Depuis notre institut a pu acquérir 8 semoirs de ce type fabriqués par la société Jens A. Schou. Nous avons été très satisfaits de ces semoirs qui permettent de mettre en place des essais de variétés très rapidement, avec une bonne précision de la densité de semis. Nous envisageons de commander d'autres semoirs de ce type."

Translation: *"I have already had the pleasure of corresponding with you in 1966 and 1967 regarding the experimental plot drills you have made.*

Our institute has purchased 8 drills of the type produced by the company Jens A. Schou. We have been very pleased with these seed drills which make it possible to carry out variety trials very fast and with very good precision of the distribution.

We intend to buy more drills of this type."

In a letter of April 27, 1972 Mr. Andre Pichot, Bazoches-En-Dunois, wrote:

"...Ce semoir m'a donné toute satisfaction. Sa conception tout à fait originale en fait un instrument idéal pour semer une quantité de petites parcelles de sélection et d'expérimentation."

Translation: *"...This drill has given all possible satisfaction. Its original conception makes it the ideal implement to sow small plots in plant breeding."*

In a letter of May 3, 1972 Mr. P. Martin, UCOPAC, 77 – Verneuil-L'Etang, wrote:

"...Nous pouvons vous dire qu'à ce jour nous sommes très satisfaits du fonctionnement des machines."

Translation: *"...We can say that up to now we are very pleased with the working of the machines."*

10. Quotations, cont.

HUNGARY

In a letter of November 12, 1993 to Mr. Oyjord, Dr. J. Matuz, Director of Wheat Breeding Division of Cereal Research Institute, H-6701 Szeged, POB 391, Hungary, wrote:

“Since I have been working for more than 20 years as wheat breeder I had the possibility to see directly, how significantly our work has changed upon the introduction of your sowing machine.

Our old machines were developed originally for small farms. Their installation and cleaning after the sowing of each variety was difficult and laborious. In order to avoid or diminish this long procedure, we set the machine according to the line to be sown and sowing of plots was made corresponding to the randomization. At least 3 persons had to assist in sowing: one operating the machine, one cleaned the same and one —running in front of the machine, showed the direction and the plots to be sown. For this latter task sometimes one person was not enough.

On the contrary, Oyjord machine made it possible to sow the plots behind each other – lines with different thousand kernel mass and germinating ability – without cleaning and adjusting and at the same time the directing became unnecessary.

Thus, the labour performance has increased at least tenfold, the experiments could be performed more precisely, the danger of blending decreased and less people have to be employed.

10. Quotations, cont.

HUNGARY, cont.

One can state without exaggeration that your machine brought a revolution in the wheat breeding experimental work because:

- The precise determination of the agronomic characteristics of the lines can be started in earlier generations, because it is possible to sow a 5m² plot using 10 dkg seed. Due to the simple and easy handling much more entries can be sown – consequently more materials (breeding lines) can be tested.*
- The seed required for all the plots of a given experiment can be exactly measured in advance, packed in cases and on the basis of a map a “programmed” sowing can be performed. The quantity of the seed material can be selected to correspond to the breeder’s needs and this dose is sown exactly in each plot.*
- The machine can be adjusted for different plot lengths and the distance between the rows can be changed, too.*
- The utilization of the experimental fields is more economic, because only at the beginning and at the end of the experimental area a turning place should be left for the machine; the margin effects are also reduced.*
- A continuous sowing with this machine is also possible when using an adapter. It proved to be applicable also for the sowing of seed multiplications of 30m² – 1000m² areas.*

Summing up: the machine constructed by you as well as the plot combines Hege, Wintersteiger and Sampo contributed to the highly mechanized sowing, harvest of our breeding materials and to a more precise execution of our experiments.

All the above advantages of your machine positively influenced the volume and effectiveness of our selection work. Thus, myself, as wheat breeder, highly appreciate your work devoted to the construction of this excellent sowing machine as well as the very useful activity you have done as founder and president of IAMFE for the mechanization of the field experiments.”

10. Quotations, cont.

HUNGARY, cont.

In a joint report of December 1993, Ing. Kunsagi, Mezogazdasagi Minosito Intezet, Budapest and Dr. M. Jolankai, MTA Titkarsag, Budapest, wrote:

Small plot field trials are essential for the experimental work of plant breeders and research agronomists. Since scientific evaluations require trustable and replicable data for statistical analysis, all over the world serious attempts have been done to improve the quality and utility of experimental machinery. One of the most crucial implements of experimental farming is the planter.

The introduction of the Oyjord sowing device has increased the number of experimental plots. This improvement was not only due to the higher technical efficiency, but to some other factors as well. This technical solution had an effect on experimental methodology, namely it has given a chance for the use of any statistical and randomized design as well as a free variation in plant density applications.

The new sowing process has altered the work phases. Formerly the planting time was used to measure, calibrate, sort and fill seeds. Now most of the work can be done in a preparatory phase. All seed items can be prepared and filled into bags, magazines or cartridges before sowing. The efficiency of planting is no subject of the seed anymore. To characterize the changes in sowing efficiency the following table shows some figures:

Number of 10m² plots/hr

Conventional sowing device (Saxonia 18): 15 – 20

Oyjord sowing device with stops between plots: 60 – 100

Oyjord sowing device with continuous move: 200 – 400

During the past two decades Oyjord sowing devices conquered the world of field experiments. Wherever you are, whatever planter you seed, you can almost be sure about that the very implement houses an Oyjord device. There is an evidence, that this technical invention represents the most successful contribution of engineering in the field of agricultural research.”

10. Quotations, cont.

INDIA

In a letter of Nov. 23, 1973 Mr. S.P. Kulshreshta, Associate Professor, G.B. Pant University of Agriculture & Technology, Department of Agricultural Engineering, Pantnagar, Distt. Nanital (U.P.), wrote:

“...We have at our Experiment Station one of your Self Propelled Oyjord Experimental Seed Drill (No. 87) of 1969 make and is being used extensively for sowing of wheat crop in experimental plots. We are very much satisfied with its working.”

In a letter of Oct. 19, 1982 Mr. Bheem Singh, Senior Farm Manager, Farm Operation Service Unit, Indian Agricultural Research Institute, New Delhi, wrote:

“...This station has three Oyjord experimental seed drills. Two of these were brought in by the Rockefeller Foundation in the late sixties and the third one was bought in 1980. All the three machines are in use after making certain changes in the old models. The petrol engine was replaced by self starting diesel engine in one machine whereas the second one was converted for mounting on tractor in 1979.”

“I am glad to inform that the experimental seed drill designed by you is the most wanted equipment at this research station.”

KENYA

In a letter of February 7, 1975 Mr. Alan D. McMillan, P. Ag., Northern Sales Limited, Winnipeg, wrote:

“I used one of your small plot seeders at Njoro, Kenya and I was impressed with the accuracy of the machine.”

10. Quotations, cont.

LEBANON

In a letter of June 19, 1972 Dr. J. Dean McCrary, Agricultural Machinery Specialist, The Arid Lands Agricultural Development Program, Ford Foundation, Beirut, wrote:

“It was only a very short time before the two planters were received with great enthusiasm. The research plantings, all seeded by the Oyjord planters, were extraordinary.”

“The wheat and barley nurseries were all seeded in the fall. About a month ago the rice nurseries covering about 25 acres were also seeded very successfully, using the Oyjord planters.”

“...In general, I personally have only the highest praise for the machines. I can report the same from the Lebanon and Egypt as well as Iran.”

And in a letter of Sept. 14, 1972 Dr. J. Dean McCrary, Beirut, wrote:

“...Thank you for your prompt attention given to our order for an additional plot planter for Egypt. This makes three Oyjord planters being used in our cooperative research efforts in Egypt. Two were used last year and the results were extremely satisfactory.”

10. Quotations, cont.

MEXICO

In a letter of February 22, 1983 to the Director General of the Norwegian Agency for International Development (NORAD) Dr. Arthur Klatt, Associate Director, Wheat Program, International Maize and Wheat Improvement Centre (CIMMYT), wrote:

“...In the late 1960s and early 1970s the wheat research program in CIMMYT seeded all of its nurseries by hand. In some years over one hundred hectares of breeding nurseries, yield trials and multiplications were seeded. In about 1972, we make the decision to mechanize the program and of course the first piece of equipment to be purchased was the Oyjord Drill. We soon learned of the utility and efficiency of this drill and proceeded to purchase many more drills. In the late 1970s a double cone drill was developed by Mr. Oyjord and this drill greatly facilitated the seeding of segregating populations. We have subsequently added several of these drills to our machinery pool. Today we have a total of 14 single and double cone drills. In the past when all of the seeding was done by hand it frequently took us more than one month to seed our breeding nurseries of approximately 80 hectares. Today we have more than 180 hectares of breeding nurseries and yield trial plots and we seed our nurseries in about 10 to 14 days.

In a similar manner, national research programs around the world have adopted the Oyjord Drill. Of course, we have encouraged many national programs to purchase these drills to facilitate their breeding activities, and in many cases we have made the purchases for them. On the basis of a recent questionnaire of CIMMYT, we estimate that approximately 65% of the national programs around the world are using mechanized seeders and probably more than 90 percent of these programs are using Oyjord Drills. This machine has allowed the programs to expand in size and has facilitated more uniform seeding and germination. It is our experience that normally the first type of mechanization requested by a national program is a mechanized seeder and normally they specifically request an Oyjord Drill.

These inexpensive drills have probably saved untold thousands and maybe even millions of man hours in cereal research programs around the world. More importantly, they have let to more accurate research results which has facilitated the selection of better varieties. Many programs consider them an indispensable part of the research program and new requests come in everyday for additional drills.”

10. Quotations, cont.

NETHERLANDS

In a letter of June 8, 1972 Ir. R.M. ten Kate, Veredelingsbedrijf Landbouwbureau Wiersum, Dronten, wrote:

“...In general the work by the plot drill was very good.”

NORWAY

In a letter of May 23, 1960 Mr. Mons Bjaanes, Cereal Breeder, State Experimental Farm Moystad, wrote about the 4 row and the 10 row improved prototypes (1959/60) of the Oyjord plot drills (translation):

“...The new drills have finally ended the time of galley slavery at Moystad. It was completely without sense that 3 strong men should pull the old monster of a drill (Pracner) in our technical time when the Russian are shooting goal on the moon.

May I congratulate you with the good result. This is the best solution of the experimental seed drill problem I have seen.”

In his greetings to the Norwegian Institute of Agricultural Engineering (LTI) at the celebration of its 40th anniversary on Nov. 13, 1987, Mr. Syver Aalstad, First Vice Chairman of The Norwegian Farmers Union, among other statements made the following statement about the Oyjord plot drills (translation):

“...And LTI helps our helpers. – One of these is the Experimental rings, which have got an invaluable help in the experimental seed drills from LTI. – You can be proud that this has become a world article and at the same time, the results of the experiments have given our farmers answers of practical value for choosing the best varieties and cultivation methods for our conditions.”

POLAND

In a letter of February 19, 1972 Dr. Jerzy Brykczynski, Stacja Hodowei Roslin, Dzial Hodowil, pow Grojec p. tn 1, Laski, wrote:

“...We have the pleasure to inform you that your drill is a very good one for our purposes and we are using it successfully.”

10. Quotations, cont.

RUSSIA

At the 11th International Conference and Exhibition on Mechanization of Field Experiments (IAMFE/AAB UK 2000, Mr. N. Peday, Director of VIM, Central Constructon Bureau, Moscow, told that 600 tractor mounted plot drills of the Oyjord type had been made in his factory before 1989 in the old Soviet Union.

SOVIET UNION

During a meeting in the Ministry of Agriculture on November 21, 1983, Professor N.N. Ulrich, Chief, All-Union Research Institute of Agricultural Mechanization, Moscow made the following statement to Mr. Oyjord:

“Your plot drills have made a revolution in plant breeding in our country.”

(In 1967 Soviet Union purchased 20 Oyjord self-propelled plot drills from Norway. When the Norwegian manufacturer, Jens A. Schou Mek Verksted could not deliver 1000 drills a year later, they decided to make their own copies of the Oyjord plot drills. They decided to make it tractor mounted instead of self-propelled).

SPAIN

In a letter of Nov. 7, 1973 Mr Jesus Comenge Ensenat, Ing. Agronomo, Agrar s/a, Zaragoza, wrote:

“During our last trip to France we saw at work the self-propelled trail and experimental sowing machine (“THE OYJORD EXPERIMENTAL SEED DRILL”), built by your company and became very satisfied of its performance.”

SUDAN

In a letter of April 4, 1983 Mr. A.B. EL Ahmadi, Head, Plant Breeding Section, Gezira Research Station, Wad Medani, wrote:

“...Our wheat breeder is very much satisfied with the Oyjord tractor-mounted drill which he has been using for the last five years without any trouble.”

10. Quotations, cont.

SWEDEN

In a letter of March 22, 1974 N.O. Hagberth, Oat breeder, G. Ewertson, Barley breeder, G. Svensson, Wheat breeder, H.A. Jonsson, Forage crop breeder, Weibullsholm, Lnadskrona, wrote:

“The change from the older drills to the Oyjord type reduced the time for planting the cereal trials from 5 or more days of hard work to about one day on the seat. The possibility to plant all the yield trials within one day under good conditions is very important for the reliability of the trial results. With these drills all the breeding material of cereals from plant progeny plots (1m², 600-800 plots/hour) to main yield trials (16m² plots, 150-200 plots/hour) can be planted with the same drill. Earlier the plant progeny plots were handsown. Today one drill served by three persons are replacing at lease 50 people. Again it means that all the plots will be planted within a few days under optimal conditions without too much backache.

The use of the Oyjord drill for sowing grasses and clovers has meant a fair reduction in the time required for sowing the yield trials. However, in seeding some species of grasses with a low seed weight it is necessary to stop between the plots for clearing the funnel as the seeds might adhere to the plastic funnel due to static electricity.

This reduces to some extent the time saving which on the other hand is great enough to mean a big step forward in the mechanization of the field work also in these crops.”

In a letter of March 11, 1991, the Barley breeder Gunnar Svensson, Weibull AB, Landskrona wrote (translation from Swedish):

“But first of all I would like to underline how much your pioneer work has meant in the mechanization and above all in the drilling of field experiments, not least for the plant breeding.

Fajer Fajerson, who has taken part during 45 years of development, has stated that the greatest steps forward in his time have taken place in the drilling of field experiments. The Oyjord machines have meant quicker (10 – 20 times), safer drilling of field experiments with less work but with better quality of the experiments that followed.”

10. Quotations, cont.

UNITED KINGDOM

In a letter of April 26, 1972 Mr. D.A. Lawes, Arable Crop Department, University College of Wales, Near Aberystwyth, wrote:

“As you will remember we have been using your seed drill at this Station for a number of years now. We are extremely pleased with it.”

In a letter of May 2, 1972 Dr. F.D. Judge, Development Biologist, Uniroyal LTD., Bromsgrove, Worcestershire, wrote:

“...We have been using the plot drill and it has performed very satisfactorily.”

In a letter of May 12, 1972 Mr. C.S. Elliott, Head of Trials Branch, National Institute of Agricultural Botany, Cambridge CB3 OLE, wrote:

“...I anticipate that before long we shall be placing an order with you for a number of Oyjord plot drills for use at our various Regional Trial Centres throughout this country. We already have several of these drills here at Cambridge and are very pleased with them.”

In a letter of May 22, 1972 Mr. J. Hamblin, Department of Applied Biology, University of Cambridge, wrote:

“We are very satisfied with the overall efficiency of the machine.”

10. Quotations, cont.

UNITED KINGDOM, cont.

In a letter of Nov. 3, 1972 Mr. D. Jackson, Field Trials Technical Officer, Murphy Chemical Ltd., wrote:

“...We have now used the drill for two seasons and find it very suitable for our cereal trials. It is a versatile machine and we find we can drill many plots in a short time.”

In a letter of Oct. 15, 1973 Mr. F.K. Niendorf, Experiments Officer, National Vegetable Research Station, Wellesbourne, Warwick, wrote:

“...I have now used our new drill for one season and I am very happy to say it has been extremely successful.”

(This is a 3 x 2 row Oyjord tractor mounted plot drill used in vegetable research.)

In a letter of June 8, 1973 Charles Sharpe & Co., Sleaford, Lincs., wrote:

“...We have been using one of your tractor mounted plot drills with great success for Sugar Beet trials for the past three years and are now contemplating buying a second drill for Pea and Bean trials.”

In a letter of July 22, 1975 Mr. Alan Young, Trials Unit, Scottish Plant Breeding Station, Pentlandsfield, Roslin, wrote:

“...We have now used both machines for two years and find them most useful. It is intended that all future sowings will be done with these drills and we will be interested to receive any current information which you have in this field.”

Revised May 1998 by Torunn Skedsmo

Added by Egil Øyjord in July 28, 2000 - New information from Russia.

Chapters 1-8 translated by Torbjörn Leuchovius, May 2011