



Agricultural Mechanization Promotion Group (IAM-BRAIN)



Institute of Agricultural Machinery (IAM)

URL : <http://brain.naro.affrc.go.jp/iam/>

Bio-oriented Technology Research Advancement Institution(BRAIN)

Incorporated Administrative Agency

National Agriculture and Food Research Organization (NARO)

Introduction

Agricultural Mechanization Promotion Group of BRAIN is known by the name of Institute of Agricultural Machinery (IAM).

History of IAM-BRAIN

- Oct. 1962 Institute of Agricultural Machinery (IAM) was founded as a semi-governmental corporation specializing research and development as well as testing of farm machinery for promotion of agricultural mechanization in Japan.
- Oct. 1986 Bio-oriented Technology Research Advancement Institution (BRAIN) was founded as a legally approved corporation, inheriting the whole properties and activities of former IAM. The objective of BRAIN is to conduct research, development and testing on agricultural machinery, and newly to promote research and development on biosciences and bio-technology in the field of agriculture, which is not only conducted by IAM-BRAIN itself, but also by private sectors.
- Oct. 2003 IAM-BRAIN united itself with an incorporated administrative agency, The National Agriculture and Bio-oriented Research Organization (NARO).
- Apr.2006 Reorganized as IAM-BRAIN, National Agriculture and Food Research Organization (NARO).

Outline of Activities

IAM-BRAIN conducts its main assigned roles in the field of research, development and testing of agricultural machinery as a sole and competent organization in our country. The activities of IAM-BRAIN are currently focused on the followings:

Research & Development of Agricultural Machinery

Fundamental and initiative research and development of agricultural machinery, putting stress on performance, safety, durability etc. to realize the high productivity agriculture

Urgent Research & Development of Agricultural Machinery

Research and development of agricultural machinery for renovation of farm management such as epochal elimination or reduction of labor, a high advancement of production management, an effective utilization of natural resources and so on under close cooperation with different stakeholders such as manufacturers, end users, research institutions including those of different fields

Testing and Evaluation

Testing and evaluation of agricultural machinery based upon the requests of manufacturer or importer on aspects such as performance, safety, environmental effects etc, in order to help spreading high quality agricultural machinery

Publication and Service

Publicity service on research, development and testing results, technical advice to manufacturers and other private as well as public sectors, permission of using patents to industries, contracted research/ investigations and others

Other activities

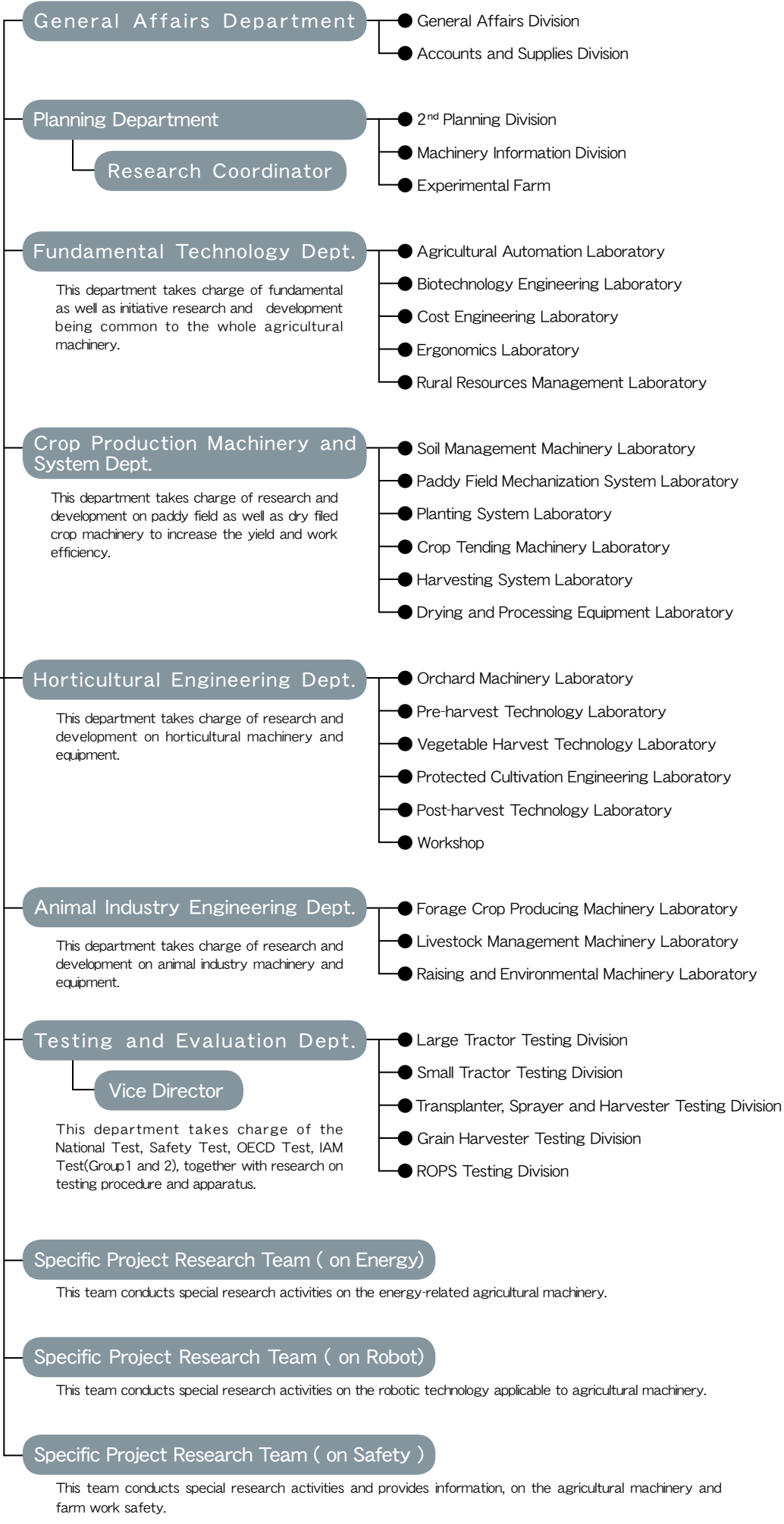
Survey on agricultural mechanization, collection and provision of technical information, technical training, international cooperation, opening of subject library, display of old and new agricultural machinery etc. are also a part of our activities.

Organization

President
Senior Vice-President
Vice President

Auditor

Director General



Fundamental Technology Department

Research Activities

This department takes charge of fundamental as well as initiative research and development being common to the whole agricultural machinery.

Agricultural Automation Laboratory

Biotechnology Engineering Laboratory

Cost Engineering Laboratory

Ergonomics Laboratory

Rural Resources Management Laboratory

Agricultural Automation Laboratory

Sensing Technology, Automation Technology, Agricultural Robot



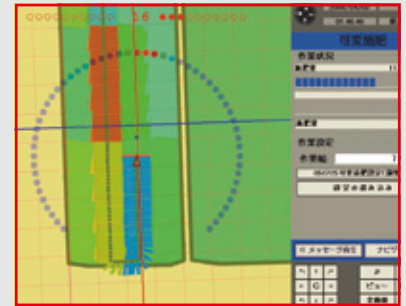
Unmanned Seeding Operation by Tilling Robot

Robot tractor executing unmanned operations such as tillage, soil puddling and seeding.



Steering-Assist System for Agricultural Vehicle

This is a hands-free system for operation, capable of traveling along crop rows, ridges and borders in fields, or toward a lamp putted in the direction. (Under development)



Operation Navigator

"Farm Vehicle Navigator" useful for wide implement operation and variable rate fertilizer application for precision farming

Biotechnology Engineering Laboratory

Measurement of Plant Growth Response, Mass Production of Seedling, Biotechnology-related Equipment

Grafted seedling ▶



Grafting Robot for Cucurbits

A machine that can graft cucurbits automatically. (Commercialized)



Full-Automated Grafting Robot for Cucurbits

A machine that processes automatically not only grafting work but feeding of seedlings

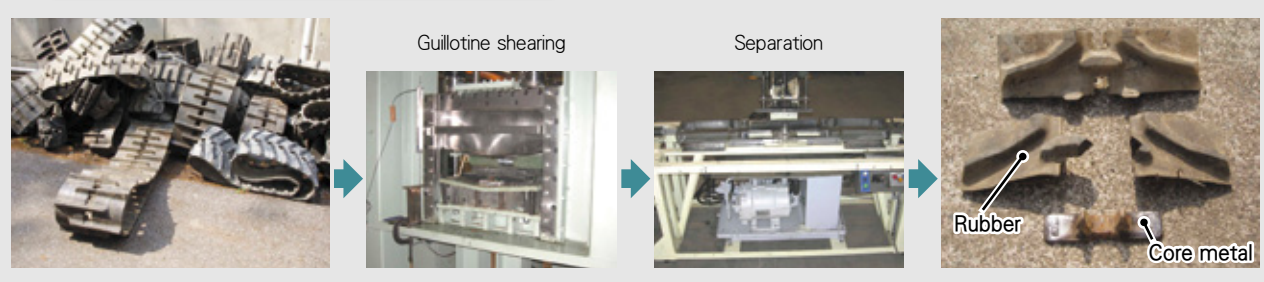


Aligning Seeder for Big and Elliptical Seeds

A seeder capable of arranging the direction of seed, which is big and flat such as pumpkin. The bottom right of the picture is state after seeding (Commercialized)

Cost Engineering Laboratory

Life Cycle Costing, Materials Expense Reduction and Recycling Technology



Recovery of Core Metal in Scrapped Rubber Tracklayer

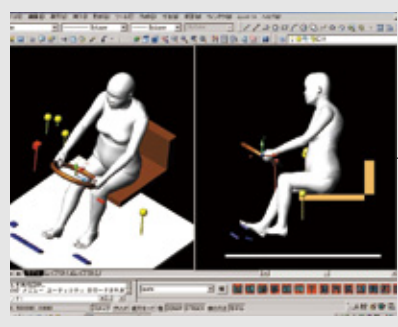
Easy and inexpensive recycling technology aiming at the promotion of effective utilization of iron resources

Ergonomics Laboratory

Safety and Comfort of Farm Work



Low Vibration Bush Cutter
The bush cutter with 30-40 % lower hand-transmitted vibration was developed for the purpose of preventing vibration disorders. (Commercialized)



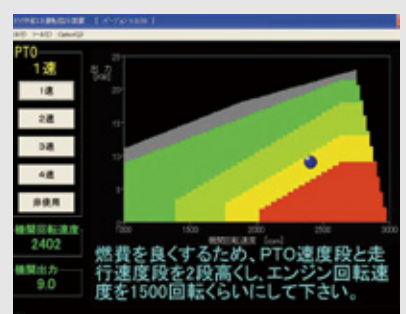
Universal Design Guidance for Agricultural Machinery
The universal design guidance for agricultural machinery was developed based on the research on the usability for farmers including elder and women.

Rural Resources Management Laboratory

Application of Unutilized Resources, Energy Saving, Environmental Protection



Soil Crusher-sieve
A machine that crushes and sieves the dried sample soil for soil analysis (Commercialized)



Operational Condition Indicator of Tractor for Energy Saving
An apparatus that indicates fuel saving operational condition of a tractor



Disk-type Cultivator-Ridger
A disk-type cultivator-ridger that suits to wet soil. (Commercialized)



Crop Production Machinery and System Department

Research Activities

This department works for research and development on paddy field as well as dry field crop machinery to increase the yield and work efficiency.

Soil Management Machinery Laboratory

Paddy Field Mechanization System Laboratory

Planting System Laboratory

Crop Tending Machinery Laboratory

Harvesting System Laboratory

Drying and Processing Equipment Laboratory

Soil Management Machinery Laboratory

Agricultural Vehicle, Tillage, Fertilizer Application and Seeding



High-speed Rotary Cultivator

This rotary cultivator is capable of cultivating at higher speed, and with better working precision level than a conventional machine. (Commercialized)



High-speed Puddling Rotary

This puddling rotary is capable of puddling at higher speed or by fewer number of puddling, and better working precision than a conventional machine. (Commercialized)



Handy-type Crop Growth Measuring Device

This measuring device is capable of estimating foliage nitrogen content of paddy rice, on which it can exactly calculate an appropriate amount of topdressing at panicle formation stage. (Commercialized)

Paddy Field Mechanization System Laboratory

Direct Seeding, Fertilizer Application, Material Handling



High Accuracy Direct Seeder for Rice on Wet Field

This seeder is developed to improve the germination rate by covering the seeds with stable thickness of soil. It can be mounted on riding type rice transplanters and paddy-management-vehicles. (Commercialized)



Variable Rate Fertilizer Applicator

The feeding rate of fertilizer can be precisely and easily adjusted during operations responding to the growing crop growth and soil fertilities. (Commercialized)



Precision Fertilizer Spreader

The metering device of this fertilizer spreader is controlled by using a new index value called "FR index" that indicates the physical property of fertilizers. The feeding rate of fertilizer is also adjusted in accordance with traveling speed of the spreader measured by a GPS receivers. (Under development)

Planting System Laboratory

Planting, Seedling Raising, Transplanting



Characteristics Test of Rice Seedling Mat

Survey of different seedling mats on adaptability for transplanter using pick up device for testing



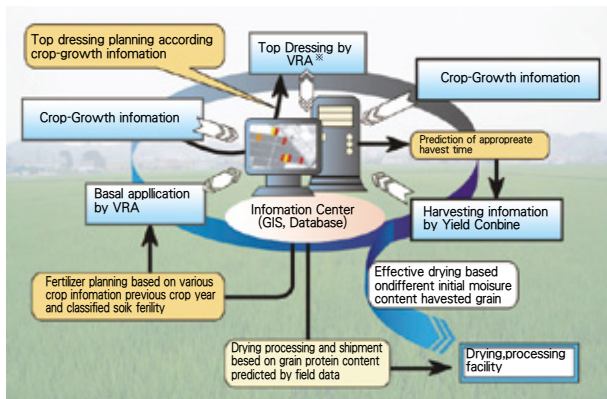
Planting Rate Control System for Rice Transplanter

It transplants seedling evenly without missing and reduces total seedling mat requirement. (Under development)



Ultra Lightweight Rice Transplanter

Handling of this machine in small scale paddy field is easy, and can be transported by hand. (Under development)



Practical Application Project for a Precision Rice Production System in Japan

This project is introducing all the devices developed in IAM-BRAIN for paddy crop measurement, fertilizer application, processing and so on, and thereby is aiming at establishment of a new farming system in which higher quality, higher profitability, and environmental friendliness can be realized.

Crop Tending Machinery Laboratory

Pest Control, Weed Control, Crop Tending



◀ Conventional nozzle



▶ Drift reduction type nozzle (air injection type)

Boom Sprayer Nozzle for Reduction of Pesticide Spray Drift

Pesticide spray drift of the developed nozzle is much less than that of Japanese conventional nozzles. (Commercialized)



Walking-type Ridge Mower

The mower can weed both top and slope surface of a ridge simultaneously and stably. Its mowing width of top surface is 30 cm and that of slope surface is adjustable from 30 to 70 cm. (Commercialized)



Riding-type Mechanical Weeder for Paddy Field

It has the weeding devices of inter-row and intra-row space of paddy field and it can weed precisely and efficiently. (Commercialized)



Low volume Sprayer mounted on Paddy-Management-Vehicle

The sprayer is capable of low volume application (the application rate is 250 L/ha) precisely and efficiently.

Harvesting System Laboratory

Harvesting, Threshing, Separating

Multi-crop Combine Harvester



This combine harvester is applicable for various crops such as rice, wheat, soybean, etc. by introducing screw threshing mechanism. (Commercialized)

Head-feeding Combine for Hilly and Mountainous Area



This small-scale combine harvester can work on a garden terrace paddy field in mountain areas. (Commercialized)

Yield Monitoring Combine



This combine harvester can measure crop data such as grain mass, moisture content, and yield while harvesting. (Commercialized)

Drying and Processing Equipment Laboratory

Drying, Processing, Storage, Quality

Recirculating Batch Grain Dryer using Far Infrared Radiation

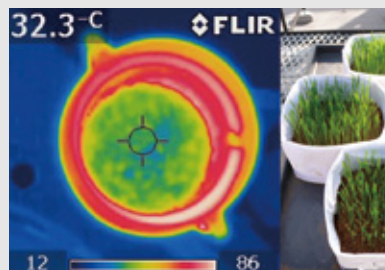


This type of dryer uses thermal energy which arises by heating of the FIR body, together with exhaust heat from coming out it, and has been rapidly spread now from viewpoint of energy saving and palatability performance. (Commercialized)

Grain Protein Sensor using Near Infrared Reflectance Spectroscopy



This sensor can measure protein contents of grain even in high moisture content or rough rice. Moreover it can be portable. (Under development)



Rice Seed Disinfection System using Super Heated Steam

This device can be high performance disinfection system applying Super Heated Steam. (Under development)

Horticultural Engineering Department

Research Activities

This department takes charge of research and development on horticultural machinery and equipment.

Orchard Machinery Laboratory

Pre-harvest Technology Laboratory

Vegetable Harvest Technology Laboratory

Protected Cultivation Engineering Laboratory

Post-harvest Technology Laboratory

Orchard Machinery Laboratory

Fruit Tree, Tea Plant



Multipurpose Monorail for Hillside Orchard

The multipurpose monorail consists of the main monorail of hill slope direction and the sub monorail of contour direction. By using the multipurpose monorail, farmer can reduce labor and work effectively to carry harvested fruit, spray chemical, and apply fertilizer. (Commercialized)



Mobile elevating work platform with a high vertical and horizontal mobility

Growers can work safely and comfortably at a high position by using this highly mobile platform. (Under development)

Pre-harvest Technology Laboratory

Seeding, Transplanting, Crop Tending, Pest Control



Clod and Stone Separator

The separator removes clods and stones from the sowing beds before potato planting. It is developed to form a soil conditioning system for potato production in Japan. (Under development)



High Accuracy Seeder for Sugar Beet

The seeder can sow sugar beet with high accuracy up to operating speed of 1.5m/s and simultaneously creates sowing beds that shelter young seedlings from strong wind. (Under development)

Protected Cultivation Engineering Laboratory

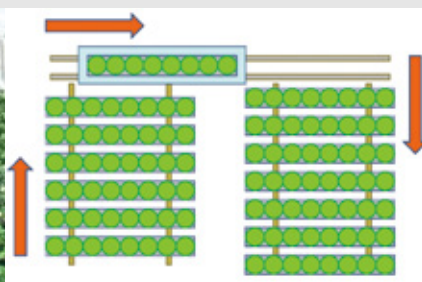
Protected Cultivation for Vegetables and Flowers

▼ Movable Benches



Movable Bench System for High-density Cultivation of Strawberry

Planting density of the developed system is about twice as high as conventional cultivation. (Under development)



Planting Machine for Chrysanthemum Cuttings

This machine assists the cutting supply task of an operator to plant accurately into plug trays. (Commercialized)

Vegetable Harvest Technology Laboratory

Harvest, Transport



Welsh Onion Harvester

This machine can dig, convey and hold welsh onions grown on a ridged fields. (Commercialized)



Cabbage Harvester

This machine can draw a cabbage out of the ridge, cut off external leaves as well as a stem, and convey the head of a cabbage alone. (Commercialized)



Small-size Sugarcane Harvester with High Chopping Performance

This machine can harvest sugarcane for biofuels with high efficiency. (Under development)



Automatic Follow-type Transport Vehicle

This machine can follow a vegetable harvester automatically and transport the harvests. (Commercialized)

Post-harvest Technology Laboratory

Vegetable Trimming, Quality Evaluation and Storage System



Welsh Onion Trimmer

This machine can cut the root, peel and leaves of welsh onion automatically. (Commercialized)



Automatic Strawberry Packer

This machine can automatically place some strawberries on the special tray and cover it by lid. (Under development)



Automatic Cabbage Packer

This machine can automatically pack some cabbages up into a cardboard box at the packing house. (Under development)

Animal industry Engineering Department

Research Activities

This department takes charge of research and development on animal industry machinery and equipment.

Forage Crop Producing Machinery Laboratory

Livestock Management Machinery Laboratory

Raising and Environmental Machinery Laboratory

Livestock Management Machinery Laboratory

Milking of Cows, Feeding and Individual management of Livestock

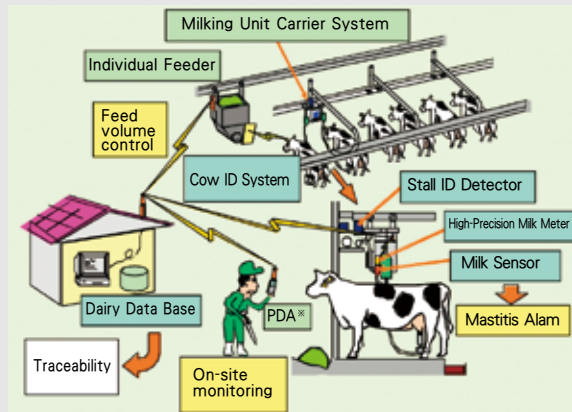
Automation of Milking in Stall Barn



Milking Unit Carrier System

The automatic carriers combined with pairs of milking units make a drastic reduction of labor force. (Commercialized)

Precise monitoring of individual livestock and security of food safety by using IT/Robot Technology



Idea of Individual Cow Monitoring System

(Commercialized)

Hygiene Management for High Quality Milk



Teat Cleaning Device

Automatic cleaning/disinfection of teat surface before milking (Commercialized)

Forage Crop Producing Machinery Laboratory

Forage Crop Production, Grass Land Management

Labor Saving Production of High Quality Corn/Maize Silage



(Rod Link Chain Type)

Roll Baler for chopped materials

This baler can form corn/maize, which was chopped by a forage harvester, into high density roll bale. (Commercialized)



(Roller Type)



Bale Wrapper

This bale wrapper is applicable to a roll bale which is formed by the roll baler of the left two photographs for chopped materials. (Commercialized)

Multi-Crop and Self-propelled Harvesting Roll Baler



(Equipped with forage paddy attachment)



(Equipped with maize attachment)



(Equipped with grass attachment)

Self-propelled Harvesting Roll Baler

This machine is available for various forage crops by changing the attachments. (Commercialized)

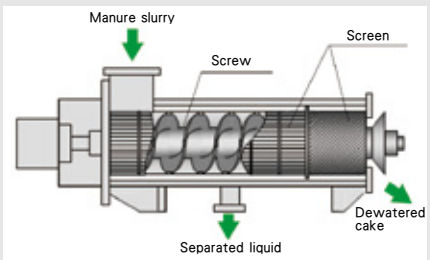
Raising and Environmental Machinery Laboratory

Animal Waste Treatment/Utilization, Environment Pollution Control

Easy Treatment of High-moisture Animal Waste



Screw Press Type Soil-liquid Separator



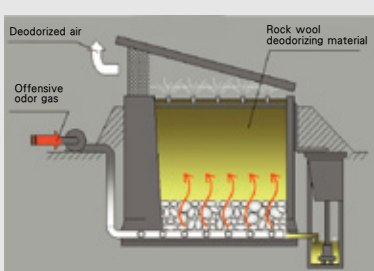
This low cost device separates animal waste into cake (75% and under of moisture content) and liquid content. (Commercialized)



Offensive Odor Control



Rock Wool-type Deodorization Facility for Cold Climate



This facility decomposes and removes odors generated from composting facilities at high concentration by microbiological actions. (Commercialized)

Tests and Appraisal Activities

This department takes charge of the National Test, Safety Test, OECD Test, IAM Test (Groupe 1 and 2), together with research on testing procedure and apparatus.

Testing and Evaluation Department

Large Tractor Testing Division

Small Tractor Testing Division

Transplanter, Sprayer and Harvester Testing Division

Grain Harvester Testing Division

ROPS Testing Division

Large Tractor Testing Division

Large Tractor, Farm Vehicle, etc.



Tractor Power Take Off (PTO) Performance Test

Available power, torque, etc. of PTO shaft for driving implements shall be measured.



Tractor Drawbar Performance Test

Available power, force, etc. for drawing implements shall be measured.

Small Tractor Testing Division

Small Tractor, Farm Transport Vehicle, etc.



Exhaust Gas Emission Test

Amount of NOx, Particulate Matter (PM), etc. in exhaust gas from diesel engines shall be measured.

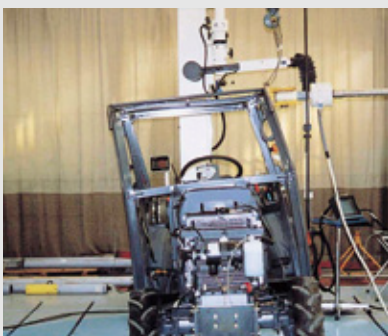


Safety Test of Monorail Transporter

Safety equipment, brake performance, etc. shall be investigated.

ROPS Testing Division

Roll-over Protective Structure, Brush Cutter, etc.



Static Strength Test of Roll-over Protective Structure

Zone of clearance for protecting the operator in the case of tractor's overturning accident shall be checked.



Safety Test of Brush Cutter (Cutting Attachment Impact Test)

A fixed steel bar shall be impacted by the rotating cutting attachment.

Outline of Testing and Appraisal Activities

Kind of Test	Targeted machinery	Major test items
National Test	Agricultural Tractor (riding type), Rice transplanter (riding type), Vegetable transplanter, Power Sprayer (boom type), Air-blast sprayer, Combine harvester (head feeding type), Combine harvester (conventional type), Potato harvester, Sugar beet harvester	Performance (including exhaust gas level), durability, ease of operation, safety equipments
	Roll-over Protective Structure (ROPS) for agricultural tractor (riding type)	Strength, ease of operation
Safety Test	Most agricultural machinery	Safety equipment, ease of operation
OECD Test	Agricultural tractor (riding type)	Performance, noise level
	ROPS for agricultural tractor (riding type)	Strength
IAM Test (group1)	Soybean thresher, Soybean grader, Head feeding type combine harvester for seed crop, Oil heater for green house, Low volume sprayer for green house, Driving-disk type plow, Trencher, Manure spreader, Side row fertilizer applicator attachment for rice transplanter	Performance, ease of operation, safety equipment
IAM Test (group2)	Most agricultural machinery and their parts. Test under code(s) of respective country(ies) and areas. English test report is available.	Decide based on the request of applicant upon agreement with IAM-BRAIN
Functional Check for road travelling agricultural motor vehicle	Agricultural tractor, Rice transplanter, Air-blast sprayer, Combine harvester	Functions required by an official notice by the Ministry of Agriculture, Forestry and Fisheries

Transplanter, Sprayer and Harvester Testing Division

Transplanter, Sprayer, Harvester, etc.



Field Performance Test of Rice Transplanter

Accuracy of transplanting, efficiency of operating, etc. shall be measured.



Wind Speed Distribution Test of Air Blast Sprayer

Wind speed distribution blown off at air outlet shall be measured.



Required Power Test of Potato Harvester

Required power of PTO shaft for harvesting, power for drawing harvester, etc. shall be measured.

Grain Harvester Testing Division

Harvester and Post-harvest Machinery for Rice, Wheat and Bean



Field Performance Test of Head Feeding Type Combine Harvester

Quality of work such as harvest loss shall be measured by sampling the materials at all outlets.



Durability Test of Combine Harvester

The durability of major parts shall be evaluated through a harvesting operation of a specific area.



Specification Check of Head Feeding Type Combine Harvester

Specifications such as equipment, dimensions, structure and material of major parts shall be measured and/or checked.

Specific Project Research Team

Specific Project Research Team (on Energy)

Specific Project Research Team (on Robot)

Specific Project Research Team (on Safety)

Specific Project Research Teams are engaged in urgently needed special research calling for immediate solution, and on effective accumulation of future research seeds for R & D of agricultural machinery.

Specific Project Research Team (on Energy)

This team conducts a special research activities on the energy-related agricultural machinery.



Processing/Drying/Collecting/Storage System of Rice Straw

Research on processing/drying/collecting/storage system of rice straw as raw materials for bioethanol fuels



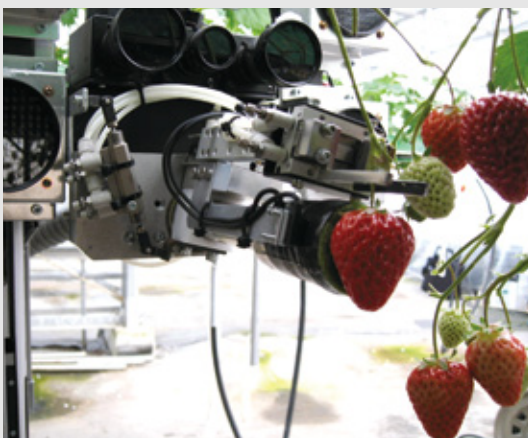
Application of Biodiesel Fuels to Tractors

Investigation of the influence on application of biodiesel fuels to tractors such as its engine power, emission gas, oil and filters.



Specific Project Research Team (on Robot)

This team conducts special research activities on the robotic technology applicable to agricultural machinery.



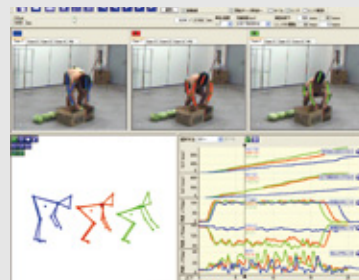
Harvesting Robot for Strawberry

The harvesting robot currently under development for strawberry, which harvests a red fruit automatically while judging its maturity.



Agricultural Vehicle Robot

Development of an auto-steering device, a navigation sensor, communication control interfaces and software, which can be used commonly for agricultural vehicle robots



Wearable assist device for farm worker

Development of a wearable device that reduces the physical strain of farm worker in a fixed posture over a prolonged time

Specific Project Research Team (on Safety)

This team conducts special research activities and provides information/data, on the agricultural machinery and farm work safety.



Development of safety-supporting techniques on farm work

“Agricultural machinery safety e-learning system”, by which people can learn various knowledge on safe use of agricultural machinery through Internet (in Japanese)



Research on safety of agricultural machinery

Collection and analysis of data which are needed for revising “Safety Test” standards, to help the improvement on safety of agricultural machinery



Provision of information/data on farm safety

Collection and supply of various information/data on agricultural machinery and farm work safety on our Web site (in Japanese)

Planning Department

This department takes charge of planning and administration of research as well as testing activities, manages intellectual property rights, also offers our technical fruits information to public.

Experimental Farm

Fields and crops for research and test activities are provided.



Workshop

Experimental or prototype machinery and measuring apparatus are made, modified or repaired.



Facility Guide

Area : 184,797m²



Area Map of IAM-BRAIN and Traffic Guide

1-40-2 Nisshin-cho, Kita-ku, Saitama-city, SAITAMA, 331-8537 JAPAN

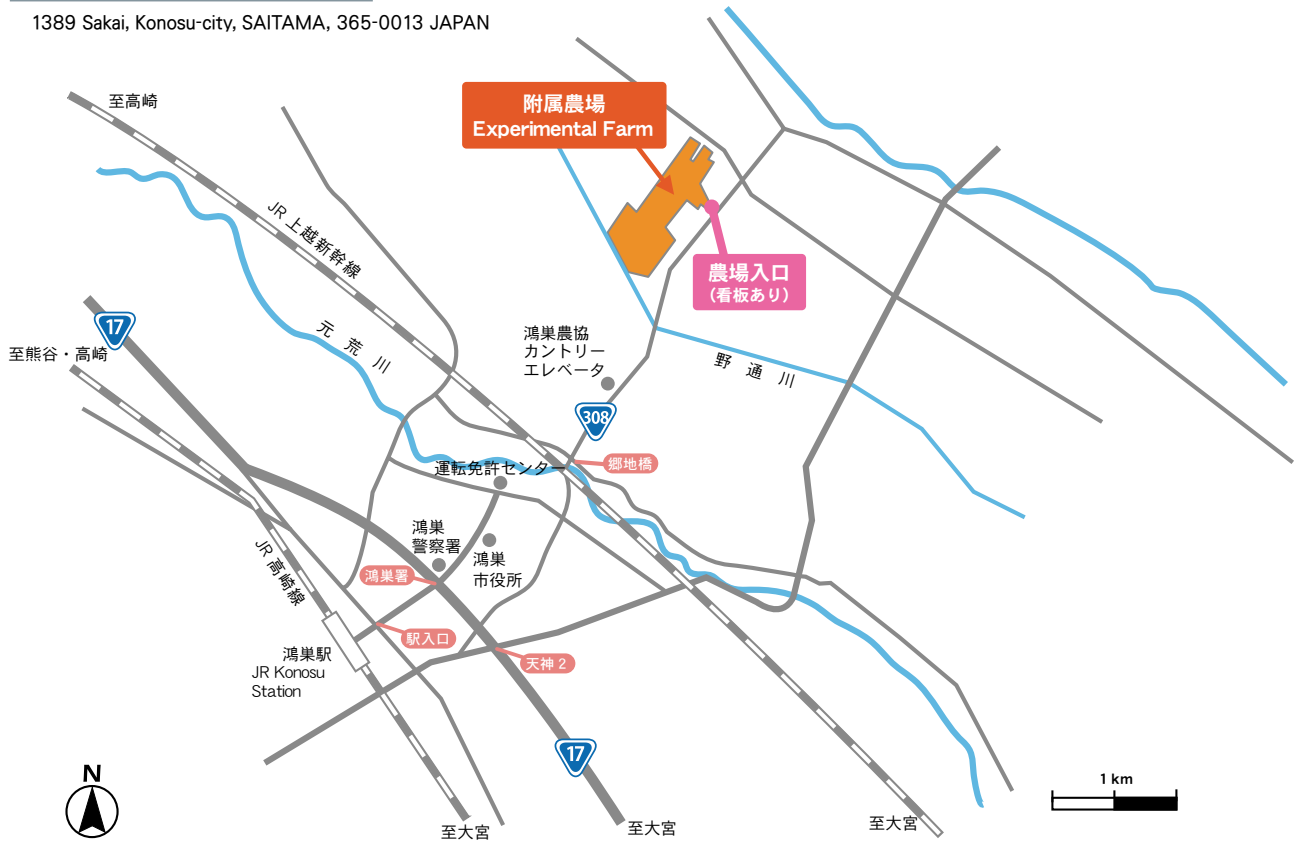


Traffic Guide to IAM-BRAIN

Exit JR Omiya station at the West Exit. Take the "Tobu" Bus for "Sanshin-jidosha" or "Cityheights Mihashi" at the No.6, or No. 7 bus stop. Get off the bus at "Jeitai-iriguchi" after approximately 10 minutes riding. The place surrounded by trees, to the direction of bus route, is the campus of IAM-BRAIN. Taxi is also available, say "Seiken-center" or "Jeitai-mae Seiken-center" to the taxi driver.

Area Map of Experimental Farm and Traffic Guide

1389 Sakai, Konosu-city, SAITAMA, 365-0013 JAPAN



◆ Cooperation & Information

1. Research Cooperation

- 1) Make joint research
- 2) Contracted research or investigation
- 3) Entrust of research and survey to outside
- 4) Collaborated research by agreement

2. Technical Transfer

- 1) Technical advice to industries
- 2) Permission of using patents to industries
- 3) Provide various technical trainings
- 4) Technical consultation

3. Dispatch and Acceptance of Researchers

- 1) Dispatch to an official trip by request
- 2) Acceptance of students and trainees
- 3) Acceptance of researchers
- 4) Undertake a member of committee by request

4. Information and Communication

- 1) Open Show Room (latest machinery) and Museum (historical machinery) to the public
- 2) Open the Library to the public
- 3) Publication of research papers, technical reports, annual reports and others
- 4) Holding the national meeting of official researchers of agricultural mechanization, research report meetings and others

5. Freedom of Information

We receive any application to request the indication of our documents, charts and electronic records.

◆ You shall always be welcome to visit our Institute, please contact us in advance.

**E-mail: www-brain@naro.affrc.go.jp
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**Institute of Agricultural Machinery (IAM)
Bio-oriented Technology Research Advancement Institution (BRAIN)
Incorporated Administrative Agency
National Agriculture and Food Research Organization (NARO)**

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Experimental Farm

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