

agMag

September 2005

A Magazine about Agriculture for North Dakota Students

North Dakota's Oilseeds

What do you think of when you hear the word *oil*? Maybe a fluid in your car? Or a liquid in a can that stops squeaks? What about the ingredient in cakes or in the skillet to make stir-fry?

Many oils come from crops grown in North Dakota. Some are edible oils (oils that people and animals can eat), and some are inedible oils (used for lubrication). These crops are called *oilseeds* because their major purpose is to produce oil.

What different kinds of vegetable oils have you seen on grocery store shelves?

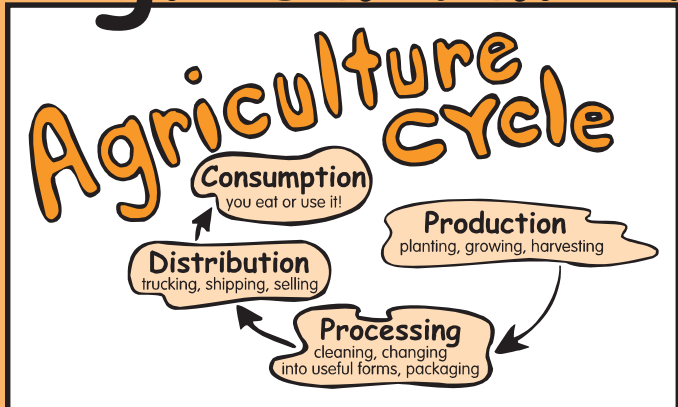
We're #1

North Dakota ranks first in the nation in the production of 12 crops. Go to the North Dakota Agricultural Statistics Service Web site at www.nass.usda.gov/nd/rank05.htm and list these crops.

Which three are oilseeds?

For more ag facts and fun, check out the NASS Kids Web site at www.usda.gov/nass/nasskids/kidpg.htm.

Agriculture!



It's farming and ranching and much, much more. It's the production, processing, distribution and consumption of our food, fiber and forestry products.



Oilseed Production

Soybeans, sunflowers, canola, flax, crambe and safflower are the major oilseed crops grown in North Dakota.

Soybeans grow in pods on the plants. Each plant may have 60 to 80 pods, and two to four pea-sized beans grow in each pod. The plant's stems, leaves and pods are covered with short, fine hairs. The soybean plant is called a legume because its roots have nodules (small rounded bumps) that give nutrients back to the soil by collecting nitrogen from the air and releasing it back into the soil.

Sunflowers come in two types: striped (non-oil) seeds and black (oil) seeds. Each head has about 1,000 sunflower seeds surrounded by big, bright yellow flower petals. Near harvest time the heavy heads droop toward the ground. Sunflowers grow very tall, up to 10 feet high. The roots may grow 6 feet into the ground.

Canola grows 2 to 4 feet tall and blooms with bright yellow flowers in early summer. The flowers produce seed pods about 2 inches long. Each pod turns brown or tan as it ripens and contains 20 or more tiny round black or brownish-yellow seeds.

Flax also comes in two types: seed flax for the oil in its seed and fiber flax for the fiber in its stem. Today most Midwest producers grow seed flax. Its main stem and branches have pretty purplish-blue flowers when it blooms. The plant may grow up to 3 feet high. The tap root may extend 3 feet into the ground with side branches stretching out 1 foot from it. The tiny seeds are in a boll or capsule containing 6, 8 or 10 brown or yellow seeds.

Crambe has branches and large, dark green leaves that are heart-shaped and crinkled. The plant has many tiny white, four-petaled flowers when it blooms. Each round seed is enclosed in a pod. Crambe grows 2 to 4 feet tall.

Safflower is a thistle-like plant with a strong central branch stem. Each branch usually has one to five yellow or orange flowers, and each flower produces 15 to 20 seeds. The plants grow 15 to 30 inches tall, and the tap roots can penetrate 5 to 8 feet into the soil.

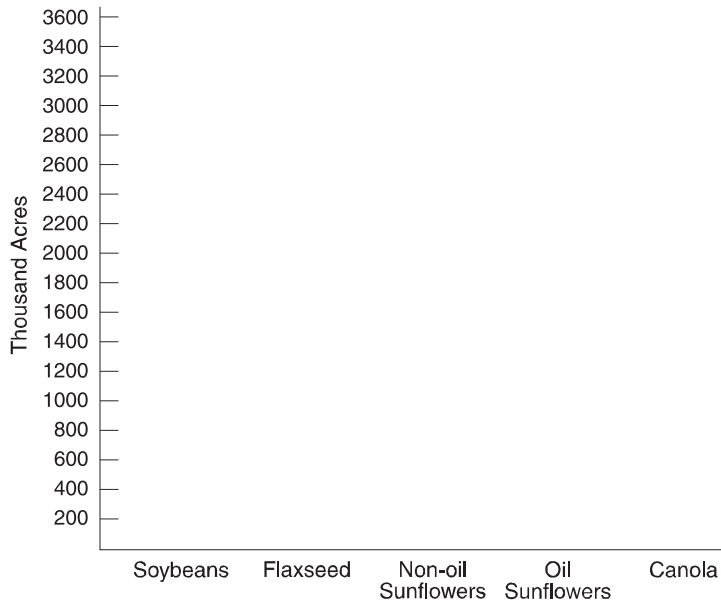
Name That Oilseed Plant

From the descriptions above, identify the different North Dakota oilseed plants.



Acres and Acres of Oilseeds

An acre is an area of land about the size of a football field, and there are thousands of acres of oilseed crops planted and harvested in North Dakota each year. Use the chart from the North Dakota Agricultural Statistics Service at www.nass.usda.gov/nd/cropintro74.pdf to fill in the bar chart to show how many acres of soybeans, flaxseed, non-oil sunflowers, oil sunflowers and canola were harvested in North Dakota in 2004.



Think About It

Are olive oil, sesame oil and peanut oil on your grocery store shelf? Why aren't olives, sesame plants and peanuts grown in North Dakota? Where are they grown?

Corn oil is also at your store. Corn isn't considered an oilseed since only the germ of the plant (the tiny part of the kernel that sprouts and grows into a new plant) is crushed for its oil. Most of the corn kernel is used for livestock feed, starch, sweeteners, corn flakes and other products.

Oilseed Processing

Where Does That Oil Come From?

They may not feel oily, but oilseeds may be up to 50 percent oil: oil sunflower seeds are about 44 percent oil, canola 40 percent and soybeans 20 percent.

The oil is usually removed by pressing – literally squeezing the oil out. Sometimes chemicals are also used to extract the oil. The product that's left after pressing is called meal, and it's an excellent protein source for livestock. Look at a bag of dog food, and you'll probably see soybean meal as an ingredient.

Many oilseeds are processed in North Dakota. Identify on the state map where these processing plants are located.

- Northern Sun, Enderlin** – oil sunflowers, soybeans, crambe
- Cargill, West Fargo** – oil sunflowers, flax
- CHS, Grandin** – non-oil sunflowers
- Minn-Dak Growers Assn., Grand Forks** – non-oil sunflowers
- Red River Commodities, Fargo** – non-oil sunflowers
- SIGCO Sun Products, Wahpeton** – non-oil sunflowers
- ADM, Velva** – canola
- Sun Valley Products, Horace** – non-oil sunflowers, soybeans
- Dahlgren, Fargo** – non-oil sunflowers

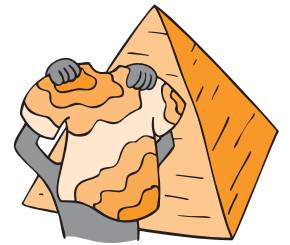


Oilseeds Then and Now

Soybeans — The first record of soybeans is in the writings of Chinese Emperor Sheng-Nung in 2853 B.C. Soybeans arrived in America in 1804 from China, not as a food source but as ballast (extra weight in the bottom of the ship to make it more stable). In 1829 U.S. farmers began growing soybeans primarily to produce soy sauce. Around World War II, the soybean plant was grown as hay for livestock rather than for its beans. But soon scientists learned about the bean's nutritional and industrial properties. In the early 1900s, George Washington Carver developed more than 300 products from soybeans. Henry Ford even built the body of an entire car out of soybeans.



Safflower — The safflower is native to Persia and northwest India. By 1600 B.C., ancient Egyptians made fabric dyes from its dried flowers. Safflower is a relatively new crop in North Dakota, grown commercially since 1957, primarily in the drier western part of the state. Safflower provides oil for deep-frying foods, inedible oil that helps paints and varnishes dry and not turn yellow, meal for livestock feed and seed for birdseed.

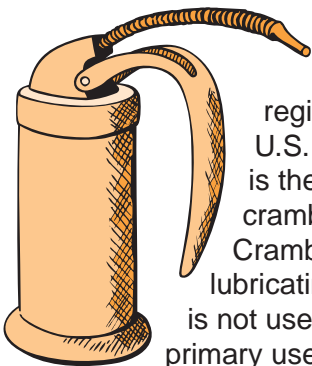


Sunflowers — It's believed sunflowers were cultivated by Native Americans in present-day Arizona and New Mexico about 3000 B.C. The name "sunflower" was given because the heads of the plants turned during the day to follow the sun to get more energy. Each morning the plants turned their heads toward the east, and by evening they were facing west. But that turning weakened the stems that hold the heads heavy with sunflower seeds so plant breeders developed plants that no longer turn but stay strong and upright.



Sunflowers come in two types. Striped seeds from non-oil sunflowers are eaten roasted in the shell or as kernels without the shell. Birds also love sunflower seeds. Black sunflower seeds are processed into oil for cooking and salads. North Dakota produces half of all the sunflowers grown in the U.S.

Canola — The oil from rapeseed, canola's "parent," was used in lamps in ancient Asia and Europe. It was used more after the development of steam power since it clung to metal surfaces washed with water or steam better than other lubricants. Today's canola is a relatively new plant, developed by Canadian plant breeders in 1974 for its nutritional qualities. The word comes from "Canada oil." In 1985, the U.S. Food and Drug Administration approved canola as a safe oil for human food. North Dakota produces more canola than any other state in the U.S.



Crambe — Crambe is native to the Mediterranean region and was introduced to the U.S. in the 1940s. North Dakota is the only state that grows crambe on a commercial scale. Crambe provides an industrial oil for lubricating and manufacturing and is not used as food. Crambe oil's primary use is as a very thin layer that prevents plastic bags from sticking together. Crambe meal is a good protein source for cattle.

Flax — Flax was cultivated in Babylon in 3000 B.C. Ancient Egyptians made fine linens from flax fiber. About 400 B.C., Hippocrates, the father of medicine, used flax to relieve abdominal pains. With World War II, demand for flax increased as more oil was needed in homes and factories. Today some people eat flaxseed in baked goods and eggs that are more nutritious since the laying hens were fed a special flaxseed diet. The linseed oil from flax is replacing some petroleum-based chemicals in paints, stains, flooring materials and other products.



Career Corner

Vern Hofman

Agricultural Engineer
North Dakota State University

A tractor fueled by soybeans?
A car that runs on corn? Many of
North Dakota's oilseeds and corn
can be processed into biofuels –
renewable fuels made from
agricultural products.

Vern Hofman, a professor in the NDSU
Department of Agricultural and Biosystems
Engineering, studies biofuels and teaches
others what he has learned.

Hofman says two major biofuels are biodiesel,
which usually is made from oilseeds to run in a
diesel engine, and ethanol, which usually is
made from corn to run in a gasoline engine.

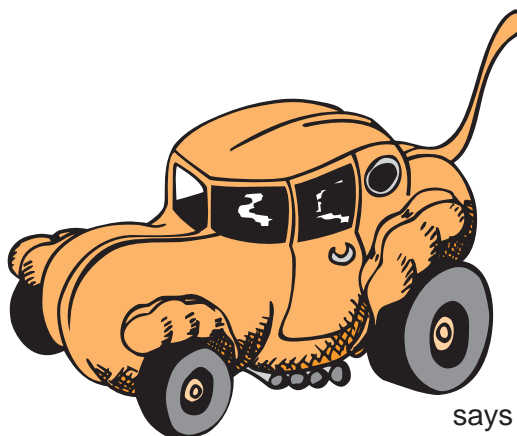
"Biodiesel can typically be made from any
vegetable plant, including crops commonly
grown in North Dakota, such as canola,
soybeans, sunflowers and safflower," Hofman
said. "There are about 350 oilseeds around the
world we can process into biodiesel. Animal
fats can also be made into biodiesel.

"Raw vegetable oils don't burn well because of
their chemistry. Processing breaks down the
large vegetable oil molecule to about one-third
its original size and makes it similar to diesel
fuel."

Compared to diesel from petroleum, biodiesel
reduces dependence on foreign oil imports and
reduces air pollution from engine emissions.
Hofman says biodiesel at low concentrations
(less than 20 percent biodiesel) can be used in
almost any diesel engine.

A plant that will process canola into biodiesel is
now being built in Minot.

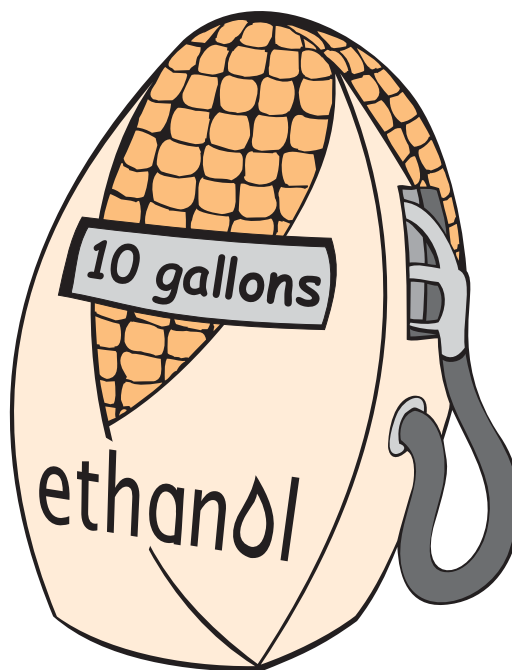
Plants in Walhalla and Grafton process corn
into ethanol, and another plant is being built at
Richardton. When your family fills the car with
gasoline, you might see a pump for a blend
that's 10 percent ethanol and 90 percent
gasoline. You might even see a pump for E85,
which is 85 percent ethanol and 15 percent



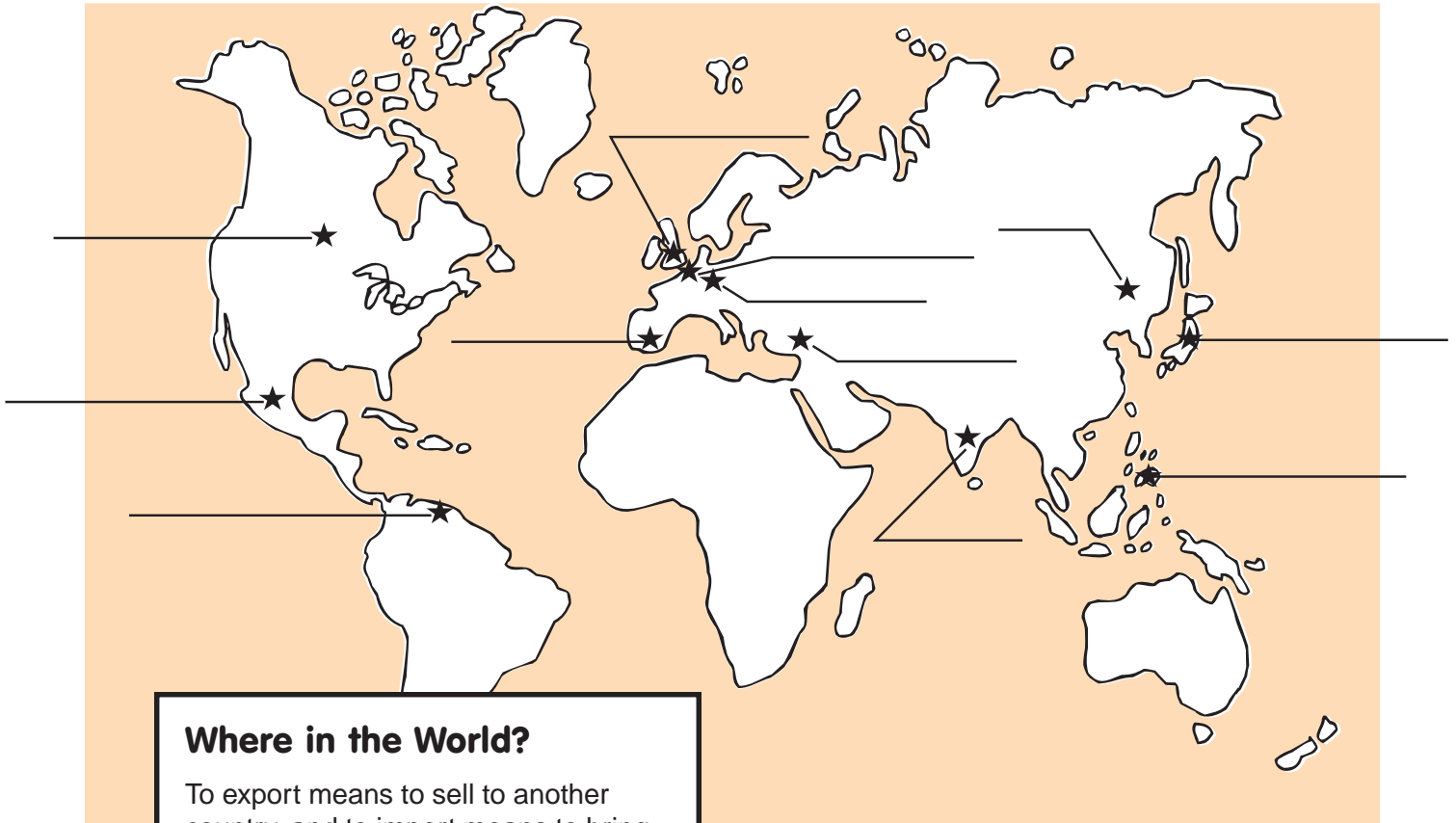
gasoline. Hofman
says all gasoline vehicles
can use the 10 percent blend, but
only flexible fuel vehicles with engines
designed for it can run on E85.

Hofman has always enjoyed doing
mechanical things and working with equipment.
He received a bachelor's degree in agricultural
engineering at South Dakota State University
and a master's degree in the same field at
North Dakota State University. Since 1975,
he has worked as a power and machinery
specialist for the NDSU Extension Service. In
addition to biofuels, he works with agricultural
spray applicators, including aerial application;
seeding and harvest equipment; power units;
and precision farming.

"I enjoy this work because we're trying to
solve problems and improve the economy of
our state," Hofman said. "I like to figure out how
something works, demonstrate it to others and
then see it commercially available."



Oilseed Distribution



Where in the World?

To export means to sell to another country, and to import means to bring into a country.

North Dakota oilseed crops are exported to many countries around the world. On the world map, write the names of the countries that are major importers of U.S. oilseeds.

Sunflower

oil - Mexico
kernels - Germany
in-shell - Spain

Soybeans

whole beans - Japan and China
oil - India
meal - Philippines and Venezuela

Canola

seed - Mexico and Canada

Crambe

oil - England

Flax

seed and oil - Canada
oil - the Netherlands and Turkey

Safflower

oil and seeds - Japan

Who Am I?

While at Tuskegee Institute in Alabama, I taught farmers to plant soybeans to replenish the soil with nitrogen and developed more than 300 new products from soybeans such as soap, dye and glue. Who am I?



Find the "Printed with Soy Ink" logo on this Ag Mag. What other publications can you find printed with soy ink?

Oilseed Consumption

In addition to providing vegetable oils, North Dakota's oilseed plants provide other foods. Striped sunflower seeds are roasted and eaten in the shell or as kernels. The kernels are used in breads, rolls, muffins and other baked goods. Flax seeds are in some multi-grain breads and cereals. Sunflower and flax seeds can be used instead of nuts in most recipes and sprinkled on salads, soups and vegetables.

Soybeans can be made into soy sauce, soy nuts, sprouts, soy milk, tofu (a cheese-like food made from curdled soy milk), meat substitutes and many other products.

Like all foods that come from plants, North Dakota's vegetable oils have no cholesterol. They're liquid at room temperature rather than solid, which means they're healthier oils than solid fats.

Oils provide vitamin E and other nutrients for your body. They also provide energy as calories. Physical activity allows you to balance the calories you eat with the calories you use. So you need to run and play to use up this energy and stay healthy.

MyPyramid

Oils are featured in the new food pyramid. Oils are important for a healthy diet but should be used sparingly. Oils can be from fish, nuts or vegetable sources. Visit mypyramid.gov to learn more.



What types of oils did you have yesterday?

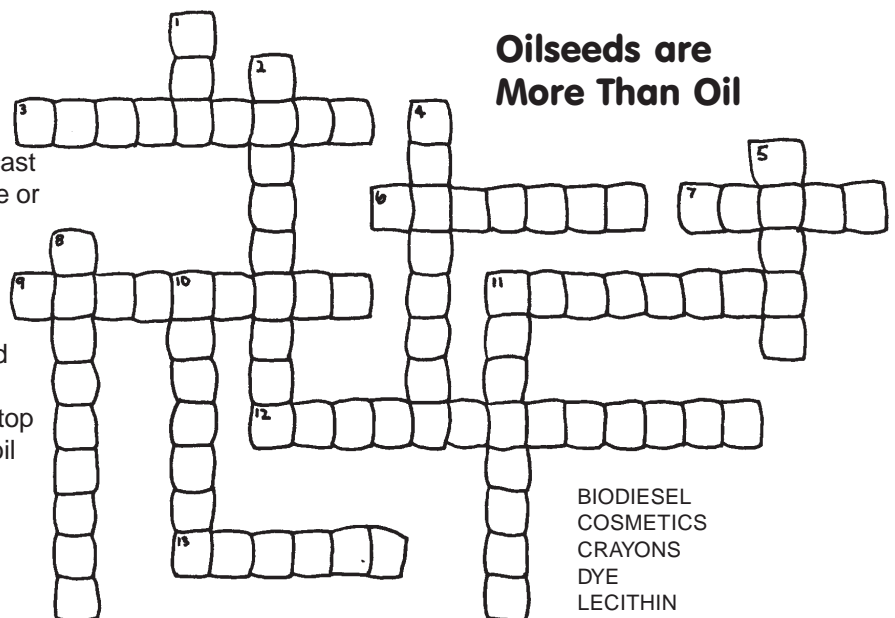
MyPyramid.gov
STEPS TO A HEALTHIER YOU

Down

1. A substance that colors materials
2. Biodegradable engine fuel made primarily from soybeans
4. Compounds that can be molded or cast
5. A liquid mixture used as a decorative or protective coating
8. Liquid or solid that reduces friction, heat and wear when applied as a surface coating to moving parts
10. Sticks of colored waxy material used for drawing
11. A durable, washable floor or countertop covering made by pressing linseed oil with other materials

Across

3. Lipstick, mascara, powder and other makeup
6. Coats surfaces with a hard, glossy, thin film
7. Liquid that adds color to wood's surface
9. A lotion or cream formulated to prevent sunburn, skin cancers and other conditions caused by excessive exposure to the sun
11. A soybean product that helps keep ingredients mixed
12. Meal from oilseeds is usually used for this
13. What this Ag Mag is printed with



Oilseeds are More Than Oil

BIODIESEL
COSMETICS
CRAYONS
DYE
LECITHIN
LINOLEUM
LIVESTOCK FEED
LUBRICANT
PAINT
PLASTICS
SOY INK
STAIN
SUNSCREEN
VARNISH

Take this issue of North Dakota Ag Mag home to share what you've learned about North Dakota's oilseed crops.

Want to learn more? Check out:

USDA for Kids at www.usda.gov/news/usdakids/index.html

Science for Kids at www.ars.usda.gov/is/kids/

Agriculture in the Classroom Kid's Corner at www.agclassroom.org/kids/index.htm

North Dakota
Agriculture
in the
Classroom



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