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## Flaxseed

James B. Johnson and Jason Jimmerson

Agricultural Marketing Policy Center  
Linfield Hall  
P.O. Box 172920  
Montana State University  
Bozeman, MT 59717-2920  
Tel: (406) 994-3511  
Fax: (406) 994-4838  
email: [ampc@montana.edu](mailto:ampc@montana.edu)  
website: [www.ampc.montana.edu](http://www.ampc.montana.edu)

*Contact:*

**James B. Johnson**  
(406) 994-5606  
[jamesjohnson@montana.edu](mailto:jamesjohnson@montana.edu)

### Background

Flaxseed, *Linum usitatissimum* L., is an annual crop used both for fiber and its edible seed. Flaxseed is generally referred to as “linseed” outside of North America, where the name flax refers only to the fiber form of the crop used for linen textiles. Flaxseed is said to have originated in the Mediterranean region of Europe. Stone Age dwellings in Switzerland contained remnants of flax and ancient Egyptians made some of their finer linens (often used to wrap mummies in tombs) from flax fiber. In the United States early colonists grew flax for home use. Commercial flax production for fiber in the United States began in 1753.

In 2002, flaxseed accounted for approximately one percent of world oilseed supply. It is used in industrial applications, for human consumption, and as a component in livestock feed.

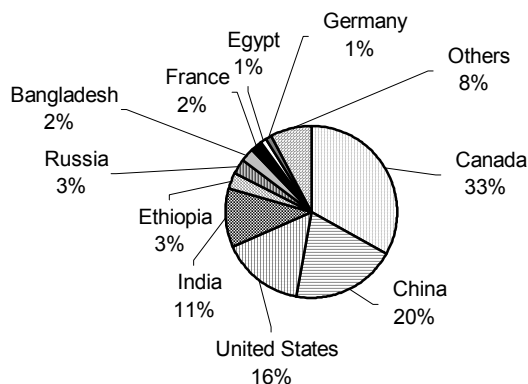
Two main types of flax are grown throughout the world: seed flax and fiber flax. Seed flax is grown for the oil in its seed. Linseed oil, a primary product of seed flax, is obtained by compressing flaxseed and applying a petroleum solvent. It is a non-edible drying oil used for manufacturing paints, varnishes linoleum, printing ink, oilcloth, putty, and plastics. Linseed oil production results in the residual products, linseed meal, livestock feed, and flaxseed stems that are used to make paper products such as cigarette paper.

Fiber flax is grown for the fiber contained in the stems of the flax plants. Fiber flax is primarily grown in Europe and Asia. The fiber is used to make fine linen cloth. The straw from fiber flax is also used to make fine paper products similar to those produced from seed flax stems.

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**Figure 1: Percentage of World Flaxseed Production by Country: 2002**



**Table 1: World Flaxseed Production, Historical**

| Year | Production in Metric Tons |
|------|---------------------------|
| 1991 | 2,688,412                 |
| 1992 | 2,225,404                 |
| 1993 | 2,189,748                 |
| 1994 | 2,455,949                 |
| 1995 | 2,525,094                 |
| 1996 | 2,480,749                 |
| 1997 | 2,281,574                 |
| 1998 | 2,748,721                 |
| 1999 | 2,875,216                 |
| 2000 | 2,064,658                 |
| 2001 | 1,968,259                 |
| 2002 | 2,048,093                 |

**Table 2: United States Flaxseed Production, Acreage and Production**

| Year | Acreage       |                 | Production      |                     |             |
|------|---------------|-----------------|-----------------|---------------------|-------------|
|      | Planted (000) | Harvested (000) | Yield (bu)/acre | Total (000) bushels | Metric Tons |
| 1991 | 356           | 342             | 18.10           | 6,200               | 143,315     |
| 1992 | 171           | 165             | 19.90           | 3,288               | 76,003      |
| 1993 | 206           | 191             | 18.20           | 3,482               | 80,487      |
| 1994 | 178           | 171             | 17.10           | 2,922               | 67,543      |
| 1995 | 165           | 147             | 15.00           | 2,212               | 51,131      |
| 1996 | 96            | 92              | 17.40           | 1,602               | 37,031      |
| 1997 | 151           | 146             | 16.60           | 2,420               | 55,939      |
| 1998 | 336           | 329             | 20.40           | 6,708               | 155,057     |
| 1999 | 387           | 381             | 20.60           | 7,864               | 181,779     |
| 2000 | 536           | 517             | 20.80           | 10,730              | 248,027     |
| 2001 | 585           | 578             | 19.80           | 11,455              | 264,786     |
| 2002 | 785           | 704             | 17.90           | 12,569              | 290,536     |

**Production**

*World<sup>1</sup>:* In 2002, world flaxseed production was about two million metric tons. Flaxseed is produced in over 47 different countries. Canada, the larger flaxseed producer, China, and the United States typically combine to produce nearly 70 percent of total world flaxseed output (Figure 1).

Annual flaxseed production has been relatively stable in recent years, averaging about 2 million metric tons between 2000 and 2002. Over the past two decades, flaxseed world production peaked at 2.9 million metric tons in 1999 and experienced its trough of 1.97 million metric tons in 2001.

*United States:* The United States produced 16 percent of total world flaxseed output in 2002. In the

United States the total acreage planted to flaxseed has fluctuated widely over the last 12 years. The area planted to flaxseed in the United States was 356,000 acres in 1991 and decreased substantially to only 96,000 acres in 1996. Since 1996, the area planted to flaxseed has increased steadily with the planted acres reaching 785,000 acres in 2002 (Table 2).

*Montana:* Montana is a relatively minor producer of flaxseed, accounting for less than two percent of total United States production in recent years. Flaxseed production in Montana reached a peak of 7,582 metric tons in 1999, but declined by about 41 percent to 4,507 metric tons in 2002 because of drought-impacted yields. The area planted to flaxseed has stayed relatively steady from 1999 to 2002 (Table 3).

Montana’s share of total United States flaxseed production was about four

percent in 1999 but declined to about 2 percent in 2001 because of the yields.

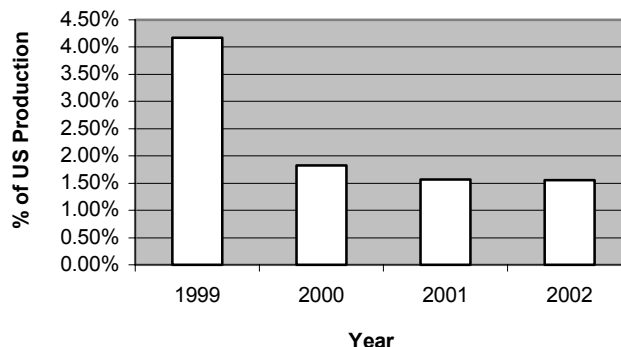
*Domestic Competition:* In addition to producers in other countries, Montana flaxseed producers compete with other states for the United States flaxseed market. United States flaxseed acreage is dominated by North Dakota, which accounts for 95 percent of United States flaxseed acres and 97 percent of flaxseed production in the United States (Figure 3). Montana, South Dakota, and Minnesota account for the other five percent of flaxseed acres and three percent of flaxseed production. Montana accounted for two percent of flaxseed acreage and production in the United States in 2002 (Figure 4).

<sup>1</sup> All data concerning world production of safflower is received from the FAOSTAT database of the Food and Agriculture Organization of the United Nations, which is compiled on a calendar year-basis. Marketing year and crop year information may yield somewhat different numerical results.

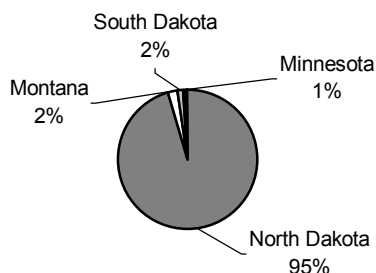
**Table 3: Montana Flaxseed Production, Historical Production**

| Year | Acreage       |                 | Production      |                     |             |
|------|---------------|-----------------|-----------------|---------------------|-------------|
|      | Planted (000) | Harvested (000) | Yield (bu) acre | Total (000) bushels | Metric Tons |
| 1999 | 21            | 20.5            | 16              | 328                 | 7,582       |
| 2000 | 16            | 14              | 14              | 196                 | 4,531       |
| 2001 | 14            | 12              | 15              | 180                 | 4,161       |
| 2002 | 17            | 15              | 13              | 195                 | 4,507       |

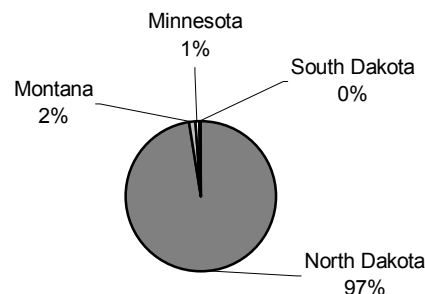
**Figure 2: Montana's Share of United States Total Flaxseed Production**



**Figure 3: Percent of United States Flaxseed Acreage by State: 2002**



**Figure 4: Percent of United States Flaxseed Production by State: 2002**



**Consumption**

Flax has generally been utilized for production of linseed oil. Linseed oil is not used as human consumption because it contains high amounts of fatty acids and has a higher change of going rancid than several other vegetable oils, and is unstable at high temperatures. Linseed oil is strictly used in industrial processes. Human consumption of flaxseed has recently increased. Recent research has led to the development of edible vegetable oil-type flaxseed or “Linola”. The new lines of flaxseed were developed into “Linola” oil contain less fatty acids and have more useful properties for human consumption. Flaxseed contains 27 to 32 percent protein and 37 to 47 percent total dietary fiber.

Flaxseed has been used as food for centuries in Asia, Europe, and Africa.

Flax is beneficial to humans and animals alike because it has a very high content of alpha linolenic acid, a high percentage of dietary fiber (both soluble and insoluble), and the highest content of plant “lignans” of all plant or seed products used for human food. Lignans appear to be anti-carcinogenic compounds.

Some uses of flax for human consumption include ready-to-eat breakfast cereals, breakfast drinks, salad dressings, salad toppings, biscuits, crackers, soups, bagels, and cakes. Flaxseed flour is used commercially in breads in the United States. Recent studies have shown that when flaxseed is eaten regularly and in moderate amounts, flaxseed improves regulation of the intestinal system, moderately reduces low-density lipoprotein (LDL) cholesterol, and increases urinary lignan formation and excretion.

**Imports**

In recent years, about 49 percent of world flaxseed production has been traded internationally. Approximately 950,000 metric tons of the world production was traded on international markets in the 2001 crop year.

In the 2001 crop year, the three largest importing flaxseed countries were Belgium, Germany, and the Netherlands (Table 4). Collectively, these three countries accounted for around 75 percent of world flaxseed trade. Other flaxseed imports were widely spread over 93 countries reporting imports of flaxseed in 2001. The United States is relatively minor importer of flaxseed with about a five percent share of total flaxseed imports (Figure 5).

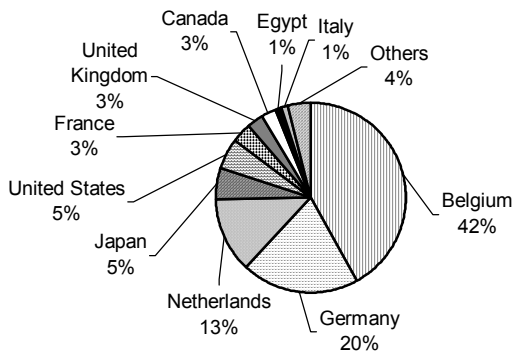
**Table 4: Major World Flaxseed Importing Countries, 2001**

| Country        | World Rank | Metric Tons |
|----------------|------------|-------------|
| Belgium        | 1          | 408,635     |
| Germany        | 2          | 193,096     |
| Netherlands    | 3          | 125,333     |
| Japan          | 4          | 52,753      |
| United States  | 5          | 50,067      |
| France         | 6          | 32,721      |
| United Kingdom | 7          | 25,843      |
| Canada         | 8          | 25,374      |
| Egypt          | 9          | 10,859      |
| Italy          | 10         | 9,459       |
| Others         |            | 38,998      |
| World Total    |            | 973,168     |

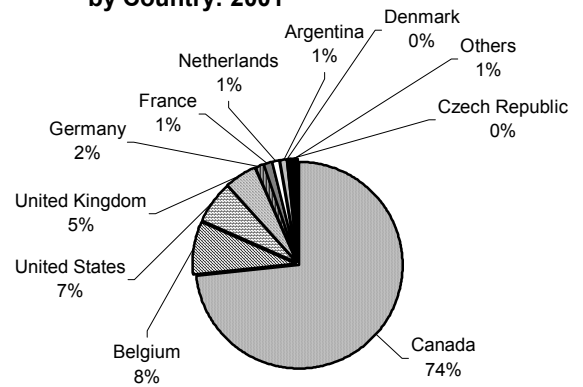
**Table 5: Major World Flaxseed Exporting Countries, 2001**

| Country        | World Rank | Metric Tons |
|----------------|------------|-------------|
| Canada         | 1          | 674,110     |
| Belgium        | 2          | 76,343      |
| United States  | 3          | 61,087      |
| United Kingdom | 4          | 44,140      |
| Germany        | 5          | 13,990      |
| France         | 6          | 12,515      |
| Netherlands    | 7          | 9,869       |
| Argentina      | 8          | 9,558       |
| Denmark        | 9          | 2,900       |
| Czech Republic | 10         | 2,526       |
| Others         |            | 10,844      |
| World Total    |            | 917,882     |

**Figure 5: Percent of World Flaxseed Imports by Country: 2001**



**Figure 6: Percent of World Flaxseed Exports by Country: 2001**



## Exports

The United States exported just over 61,000 metric tons of flaxseed in 2001, accounting for approximately 23 percent of total United States production and seven percent of the world flaxseed exports (Table 5). Canada is the world's leading exporter of flaxseed. Canada, Belgium, and the United States accounted for approximately 89 percent of world flaxseed exports in 2001 (Figure 6).

## Summary

World production of flaxseed has been around two million metric tons in recent years. About 49 percent of annual world production is traded in international markets. The United States accounts for about 16 percent of world flaxseed production and about seven percent of world exports. Flaxseed imports into the United States are relatively minimal, at about 50,000 metric tons in 2001. In recent years, Montana accounted for about two percent of the total flaxseed production in the United States. In the 2002 crop year, production of flaxseed in Montana was about forty-one percent of production in 1999, likely due to prolonged drought and disease problems.

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