United States Department of Agriculture

National Agricultural Statistics Service

# Agricultural Chemical Usage
## Postharvest Applications - Wheat

## March 2002

Ag Ch 1 (02)

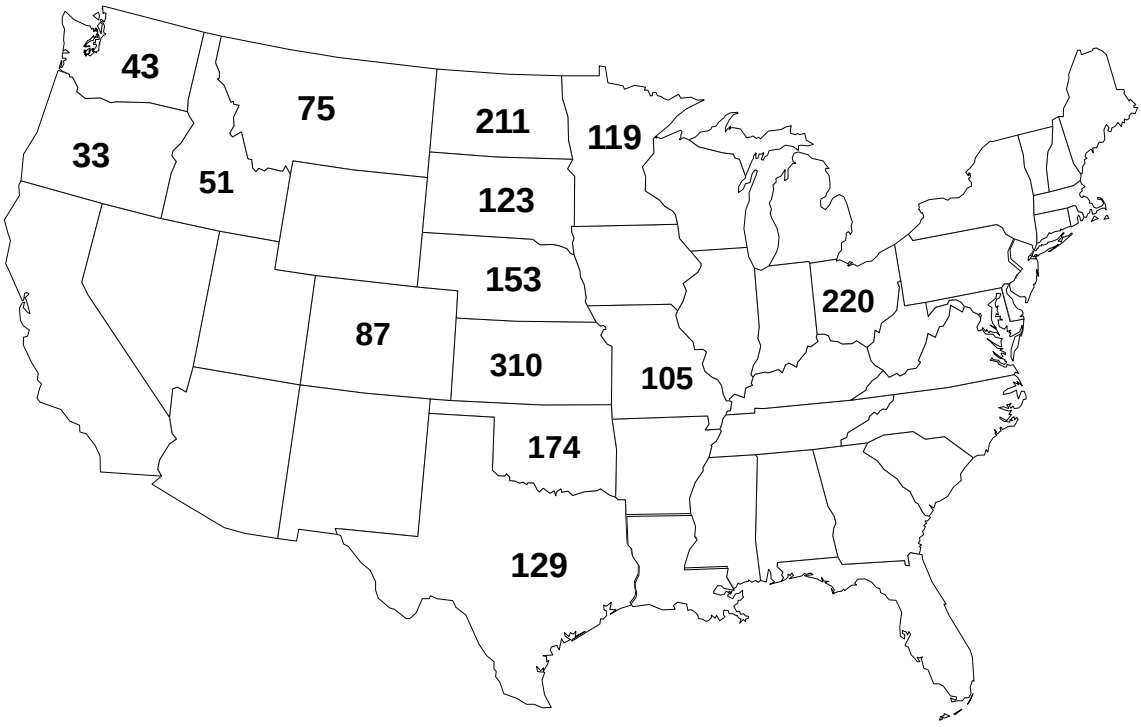
## Postharvest Chemical Use Estimates for Wheat

**Overview:** The agricultural chemical use estimates in this report are based on data compiled from the 2001 Postharvest Chemical Use Survey. The Postharvest Survey was conducted for wheat in the summer of 2001, covering the 2000 crop. All results refer to pesticide applications made at off-farm storage facilities after the crop was harvested. These applications were made at the grain storage facility or the processing facility. On-farm postharvest applications were beyond the scope of this survey. The time frame for these applications was June 1, 2000 to May 31, 2001.

In the 14 States surveyed, there were 1,833 reports summarized. The U.S. map below depicts graphically the number of summarized reports for each State in the 2001 survey.

# Wheat Postharvest

## Number of Usable Reports, 2000 Marketing Year



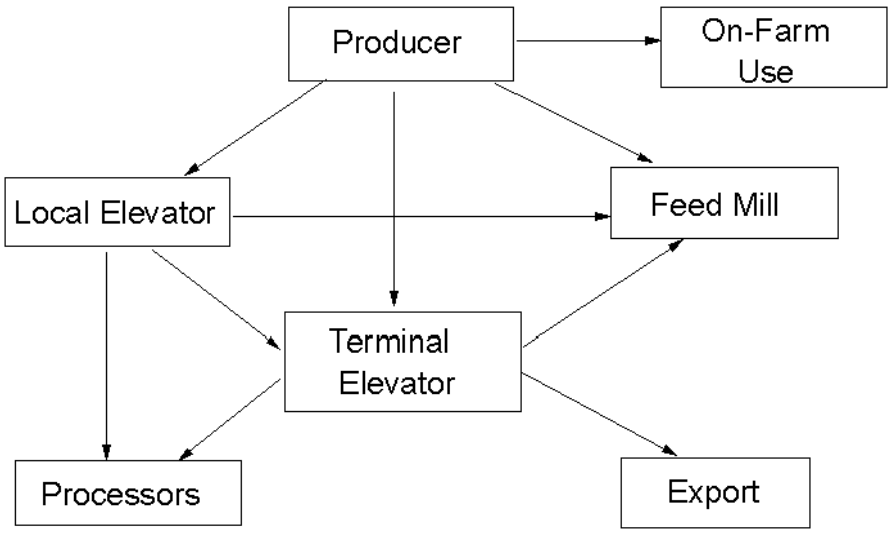
After harvest, wheat is generally marketed through local elevators, except that which is used on-farm. The grain is shipped to a larger elevator, known as a terminal elevator, which is often located at a port. A portion of the wheat crop is used in livestock feed. Grain for feed may be pulled out of the marketing channel at any point. Grain can also be delivered to a processor at any point. The diagram following these comments demonstrates the marketing channels for wheat.

Wheat moving from a local elevator to a terminal elevator will be duplicated in the reported total amount handled. The intent of the survey is to obtain the entire amount of chemicals applied to stored wheat, so this duplication in quantity handled is necessary. All wheat handled in the selected States in this survey was included; State or region of origin was not considered a factor.

Totals for the States surveyed as well as individual State totals are published for the percent of wheat treated, rate per application, rate per marketing year, and the total amount of active ingredient applied. A table detailing total pesticide usage by class for the surveyed States is also included.

Grain storage operators were also asked a series of questions concerning their pest management practices related to all grains stored. Answers to these questions are summarized and included in this report. A copy of the survey instrument used to collect the data is also included.

## Wheat Postharvest Marketing Channels



## Highlights

**Wheat Postharvest Survey:** Wheat storage facilities in fourteen States were surveyed following the 2000 marketing year. States surveyed for storage do not necessarily correspond to major wheat producing States.

**Commonly Used Active Ingredients:** The postharvest chemicals most commonly used on wheat in the surveyed States were silicon dioxide and aluminum phosphide, based on total pounds applied. Silicon dioxide is an insecticide. Although aluminum phosphide is commonly referred to as a fumigant, it is used to kill insects, insect larvae, and mites, and is classified as an insecticide by the EPA. The most commonly used fungicide, based on total pounds applied, was thiram.

**Pest Management Practices:** It was discovered during pre-survey research that pest management practices varied considerably, depending on the time of year. Therefore, seasonal data were collected on this survey and are published in separate tables labeled "Spring and Summer" and "Fall and Winter". The percentages shown in these data tables pertain to all grains handled by the facilities sampled, not just wheat.

The many varieties of winter and spring wheat are grouped into the six classes. A class is determined by color of the wheat kernel, hardness, and planting date. Below, each of the six classes is discussed.

**Hard Red Winter** - fall-seeded wheat with good milling and baking characteristics,

**Hard Red Spring** - fall-seeded wheat also with good milling and baking characteristics,

**Hard White** - newest class of U.S. wheat, used for noodles, yeast breads, and flat breads,

**Soft White** - fall-seeded wheat, good for cakes, pastries, crackers, and noodles,

**Soft Red Winter** - fall-seeded wheat used for cakes, pastries, flat breads, crackers, and snack foods,

**Durum** - the hardest of all U.S. wheats, provides semolina for pasta products.

**Wheat: Postharvest Chemical Applications,**
**Percent Treated and Total Applied,**
**States Surveyed and Total, 2000 Marketing Year**

| State | Volume Handled | Percent Treated and Total Applied | | | | | |
|---|---|---|---|---|---|---|---|
| | | Insecticide | | Fungicide | | Other Chemical | |
| | *Mil. bu.* | *Percent* | *1,000 Lbs.* | *Percent* | *1,000 Lbs.* | *Percent* | *1,000 Lbs.* |
| CO | 75.8 | 18.49 | 10.3 | | | | |
| ID | 68.4 | 15.30 | 9.4 | | | | |
| KS | 343.4 | 35.18 | 24.3 | | | | |
| MN | 163.4 | 0.78 | 1.0 | | | | |
| MO | 97.5 | 28.06 | 14.4 | * | * | | |
| MT | 136.2 | 4.32 | 5.4 | * | * | | |
| NE | 98.0 | 25.63 | 18.7 | | | | |
| ND | 320.0 | 2.48 | 2.0 | | | | |
| OH | 110.9 | 12.46 | 11.4 | | | | |
| OK | 214.4 | 48.87 | 29.8 | | | | |
| OR | 173.4 | 19.60 | 57.1 | * | * | | |
| SD | 92.0 | 5.96 | 2.2 | | | | |
| TX | 426.6 | 44.78 | 43.4 | * | * | | |
| WA | 608.2 | 9.54 | 65.6 | | | | |
| Total | 2,928.2 | 21.17 | 295.0 | 0.01 | 7.6 | | |

* Insufficient reports to publish data for this pesticide class.

**Wheat: Postharvest Chemical Applications in States Surveyed,**
**2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 18.43 | 1.0 | 0.21 | 0.21 | 115.4 |
| Chlorpyrifos-methyl | 2.09 | 1.0 | 0.30 | 0.31 | 18.9 |
| Malathion | 1.05 | 1.0 | 0.48 | 0.48 | 14.9 |
| Methyl bromide | 0.35 | 1.0 | 1.82 | 1.85 | 19.0 |
| Silica gel | 0.05 | 1.0 | 1.03 | 1.03 | 1.6 |
| Silicon dioxide | 0.32 | 1.0 | 11.58 | 12.10 | 112.6 |
| Fungicides: | | | | | |
| Tebuconazole | 0.01 | 1.0 | 0.93 | 0.93 | 0.2 |

[1] Volume handled by grain storage facilities in the fourteen States surveyed was 2.9 billion bushels. States included are CO, ID, KS, MN, MO, MT, NE, ND, OH, OK, OR, SD, TX, and WA.

[2] Insufficient reports to publish usage data for carbon dioxide, cyfluthrin, imidacloprid, lindane, phosphine gas, and thiamethoxam as insecticides; and carboxin, difenoconazole, imazalil, metalaxyl, pentachloronitrobenzene, propionic acid, and thiram as fungicides.

**Wheat: Postharvest Chemical Applications, Colorado, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 15.05 | 1.0 | 0.16 | 0.17 | 1.9 |
| Methyl bromide | 3.28 | 1.0 | 2.94 | 2.94 | 7.3 |

[1] Volume handled by Colorado grain storage facilities was 75.8 million bushels.
[2] Insufficient reports to publish usage data for chlorpyrifos-methyl and silicon dioxide.

**Wheat: Postharvest Chemical Applications, Idaho, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 7.63 | 1.0 | 0.10 | 0.10 | 0.5 |
| Chlorpyrifos-methyl | 4.96 | 1.0 | 0.28 | 0.28 | 1.0 |
| Silicon dioxide | 2.39 | 1.0 | 4.77 | 4.77 | 7.8 |

[1] Volume handled by Idaho grain storage facilities was 68.4 million bushels.
[2] Insufficient reports to publish usage data for malathion and silica gel.

**Wheat: Postharvest Chemical Applications, Kansas, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 33.48 | 1.0 | 0.14 | 0.14 | 16.5 |
| Chlorpyrifos-methyl | 0.30 | 1.0 | 0.23 | 0.24 | 0.2 |
| Malathion | 1.30 | 1.0 | 0.20 | 0.21 | 0.9 |
| Methyl bromide | 0.97 | 1.0 | 1.77 | 1.81 | 6.0 |

[1] Volume handled by Kansas grain storage facilities was 343.4 million bushels.
[2] Insufficient reports to publish usage data for carbon dioxide, phosphine gas, and silicon dioxide.

**Wheat: Postharvest Chemical Applications, Minnesota, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 0.40 | 1.0 | 0.36 | 0.36 | 0.2 |

[1] Volume handled by Minnesota grain storage facilities was 163.4 million bushels.

[2] Insufficient reports to publish usage data for chlorpyrifos-methyl, malathion, silica gel, and silicon dioxide.

**Wheat: Postharvest Chemical Applications, Missouri, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 25.77 | 1.0 | 0.34 | 0.34 | 8.6 |
| Chlorpyrifos-methyl | 1.28 | 1.0 | 0.33 | 0.33 | 0.4 |
| Malathion | 0.73 | 1.0 | 0.59 | 0.59 | 0.4 |

[1] Volume handled by Missouri grain storage facilities was 97.5 million bushels.

[2] Insufficient reports to publish usage data for silica gel and silicon dioxide as insecticides; and tebuconazole and thiram as fungicides.

**Wheat: Postharvest Chemical Applications, Montana, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 3.01 | 1.0 | 0.26 | 0.26 | 1.1 |
| Chlorpyrifos-methyl | 1.12 | 1.0 | 0.19 | 0.19 | 0.3 |
| Malathion | 0.12 | 1.0 | 0.39 | 0.39 | 0.1 |
| Silicon dioxide | 0.34 | 1.0 | 5.79 | 5.79 | 2.7 |

[1] Volume handled by Montana grain storage facilities was 136.2 million bushels.

[2] Insufficient reports to publish usage data for lindane and silica gel as insecticides; and carboxin, imazalil, metalaxyl, tebuconazole and thiram as fungicides.

**Wheat: Postharvest Chemical Applications, Nebraska, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 23.16 | 1.1 | 0.28 | 0.31 | 7.1 |
| Methyl bromide | 4.24 | 1.0 | 1.18 | 1.21 | 5.0 |

[1] Volume handled by Nebraska grain storage facilities was 98.0 million bushels.
[2] Insufficient reports to publish usage data for chlorpyrifos-methyl, malathion, and silicon dioxide.

**Wheat: Postharvest Chemical Applications, North Dakota, 2000 Marketing Year [1]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 0.98 | 1.0 | 0.21 | 0.22 | 0.7 |
| Chlorpyrifos-methyl | 1.37 | 1.0 | 0.25 | 0.25 | 1.1 |
| Malathion | 0.13 | 1.0 | 0.45 | 0.45 | 0.2 |

[1] Volume handled by North Dakota grain storage facilities was 320.0 million bushels.

**Wheat: Postharvest Chemical Applications, Ohio, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 10.48 | 1.0 | 0.16 | 0.16 | 1.9 |
| Chlorpyrifos-methyl | 1.01 | 1.0 | 0.34 | 0.34 | 0.4 |
| Silica gel | 0.40 | 1.0 | 1.80 | 1.80 | 0.8 |
| Silicon dioxide | 0.40 | 1.0 | 16.17 | 16.17 | 7.1 |

[1] Volume handled by Ohio grain storage facilities was 110.9 million bushels.
[2] Insufficient reports to publish usage data for malathion and methyl bromide.

**Wheat: Postharvest Chemical Applications, Oklahoma, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 48.65 | 1.1 | 0.22 | 0.23 | 24.3 |
| Silicon dioxide | 0.59 | 1.0 | 4.13 | 4.24 | 5.3 |

[1] Volume handled by Oklahoma grain storage facilities was 214.4 million bushels.
[2] Insufficient reports to publish usage data for chlorpyrifos-methyl and malathion.

**Wheat: Postharvest Chemical Applications, Oregon, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Chlorpyrifos-methyl | 4.29 | 1.0 | 0.32 | 0.32 | 2.4 |

[1] Volume handled by Oregon grain storage facilities was 173.4 million bushels.
[2] Insufficient reports to publish usage data for aluminum phosphide, imidacloprid, lindane, malathion, silica gel, silicon dioxide, and thiamethoxam as insecticides; and difenoconazole, metalaxyl, propionic acid, and tebuconazole as fungicides.

**Wheat: Postharvest Chemical Applications, South Dakota, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 4.88 | 1.0 | 0.25 | 0.25 | 1.1 |
| Chlorpyrifos-methyl | 0.94 | 1.0 | 0.28 | 0.28 | 0.2 |

[1] Volume handled by South Dakota grain storage facilities was 92.0 million bushels.
[2] Insufficient reports to publish usage data for malathion and silicon dioxide.

**Wheat: Postharvest Chemical Applications, Texas, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 43.96 | 1.0 | 0.21 | 0.22 | 40.4 |
| Chlorpyrifos-methyl [3] | 0.14 | 1.0 | 0.05 | 0.05 | |
| Silicon dioxide | 0.05 | 1.0 | 6.87 | 6.87 | 1.5 |

[1] Volume handled by Texas grain storage facilities was 426.6 million bushels.

[2] Insufficient reports to publish usage data for carbon dioxide, cyfluthrin, malathion, and silica gel as insecticides; and pentachloronitrobenzene, tebuconazole, and thiram as fungicides.

[3] Total applied is less than 50 pounds.

**Wheat: Postharvest Chemical Applications, Washington, 2000 Marketing Year [1] [2]**

| Agricultural Chemical | Volume Treated | Appli-cations | Rate per Application | Rate per Mkt. Year | Total Applied |
|---|---|---|---|---|---|
| | *Percent* | *Number* | *Pounds per 1,000 Bu.* | *Pounds per 1,000 Bu.* | *1,000 Lbs* |
| Insecticides: | | | | | |
| Aluminum phosphide | 5.84 | 1.1 | 0.24 | 0.26 | 9.1 |
| Chlorpyrifos-methyl | 6.27 | 1.0 | 0.31 | 0.32 | 12.3 |

[1] Volume handled by Washington grain storage facilities was 608.2 million bushels.

[2] Insufficient reports to publish usage data for malathion, silica gel, and silicon dioxide.

**Pest Management Practices,**
**Percent of Operations Utilizing Practice,**
**All Grains Handled, 2000 [1]**

| Practice | States Surveyed | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO | ID | KS | MN | MO | MT | NE |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Mechanical Devices: | | | | | | | |
| Aeration controller | 34 | 37 | 57 | 47 | 28 | 14 | 43 |
| Deep bin sampler | 10 | 10 | 9 | 11 | 8 | 10 | 28 |
| Grain spreader in bins | 2 | 4 | 13 | 14 | 17 | 2 | 20 |
| Phosphine pellet dispenser | 20 | 14 | 52 | 8 | 17 | 16 | 24 |
| Power probe | 44 | 8 | 40 | 13 | 19 | 16 | 57 |
| Protein analyzer | 52 | 24 | 24 | 74 | 7 | 79 | 34 |
| Re-circulation fumigation device | 6 | 4 | 11 | 3 | 9 | 3 | 16 |
| Temperature cables in bins | 45 | 2 | 80 | 39 | 32 | 7 | 61 |
| Cleaning Activities: | | | | | | | |
| Clean aeration ducts | 78 | 63 | 81 | 77 | 76 | 34 | 91 |
| Clean/screen grain | | | 1 | 6 | 1 | 7 | |
| Clean surrounding areas | | 6 | 5 | 3 | 2 | 3 | 4 |
| Control vegetation around bins | 98 | 88 | 97 | 97 | 95 | 95 | 100 |
| Core bins after filling | 64 | 35 | 39 | 60 | 61 | 48 | 81 |
| Fumigate empty bins | 52 | 55 | 51 | 28 | 62 | 23 | 58 |
| Hose down empty bins | 7 | 24 | 6 | 10 | 23 | 8 | 13 |
| Pick up spilled grain | 98 | 90 | 99 | 98 | 99 | 97 | 100 |
| Spray bins/walls with insecticide | | 10 | | | | 8 | 4 |
| Sweep empty bins | 90 | 92 | 95 | 92 | 88 | 94 | 99 |
| Vacuum bins | | 12 | 2 | | | 8 | 3 |
| Other cleaning activities | 1 | | 2 | 2 | 2 | 9 | 1 |

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**Pest Management Practices,**
**Percent of Operations Utilizing Practice,**
**All Grains Handled, 2000 [1] (continued)**

| Practice | States Surveyed | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ND | OH | OK | OR | SD | TX | WA | ALL |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Mechanical Devices: | | | | | | | | |
| Aeration controller | 42 | 33 | 53 | 39 | 59 | 37 | 53 | 43 |
| Deep bin sampler | 6 | 7 | 8 | 15 | 3 | 12 | 14 | 10 |
| Grain spreader in bins | 6 | 17 | 8 | 12 | 17 | 11 | 5 | 12 |
| Phosphine pellet dispenser | 14 | 20 | 50 | 9 | 32 | 22 | 49 | 27 |
| Power probe | 14 | 45 | 18 | 6 | 21 | 36 | 7 | 29 |
| Protein analyzer | 91 | 5 | 17 | 36 | 74 | 22 | 51 | 40 |
| Re-circulation fumigation device | 2 | 6 | 14 | 15 | 5 | 13 | 7 | 8 |
| Temperature cables in bins | 24 | 72 | 65 | 6 | 22 | 33 | 9 | 46 |
| Cleaning Activities: | | | | | | | | |
| Clean aeration ducts | 79 | 85 | 80 | 58 | 88 | 82 | 72 | 78 |
| Clean/screen grain | 10 | | | 18 | 8 | 2 | | 3 |
| Clean surrounding areas | 1 | 4 | 5 | 3 | 1 | 3 | 5 | 3 |
| Control vegetation around bins | 99 | 97 | 98 | 88 | 99 | 93 | 98 | 97 |
| Core bins after filling | 51 | 69 | 35 | 30 | 58 | 48 | 47 | 54 |
| Fumigate empty bins | 35 | 50 | 50 | 30 | 58 | 71 | 58 | 49 |
| Hose down empty bins | 6 | 11 | 15 | 18 | 2 | 16 | 21 | 11 |
| Pick up spilled grain | 100 | 99 | 97 | 88 | 99 | 88 | 100 | 98 |
| Spray bins/walls with insecticide | | | | 9 | | | 23 | 2 |
| Sweep empty bins | 96 | 97 | 88 | 82 | 99 | 95 | 95 | 94 |
| Vacuum bins | 1 | | | | | 1 | 14 | 2 |
| Other cleaning activities | 2 | 1 | 1 | 9 | | 2 | 2 | 2 |

[1] Definitions of these items are included in the Terms and Definitions section of this report. See page 22.

**Pest Management Practices,**
**Percent of Operations Utilizing Practice,**
**All Grains Handled, 2000, Spring and Summer**

| Practice | States Surveyed | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO | ID | KS | MN | MO | MT | NE |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Inspect for Insects: | | | | | | | |
| Concrete Silos: | | | | | | | |
| Daily | 1 | | 2 | 4 | 4 | 1 | 4 |
| Twice a week | 3 | 2 | 6 | 2 | 8 | | 4 |
| Weekly | 12 | 2 | 27 | 7 | 15 | 4 | 21 |
| Every two weeks | 4 | 8 | 12 | 5 | 4 | 3 | 18 |
| Monthly | 20 | 16 | 26 | 13 | 5 | 12 | 23 |
| Other | 3 | 6 | 7 | 3 | 2 | 2 | 1 |
| Do not inspect | 3 | | 1 | 5 | 1 | | 1 |
| Steel Tanks or Bins: | | | | | | | |
| Daily | 3 | | 1 | 5 | 6 | 2 | 2 |
| Twice a week | 1 | 2 | 6 | 2 | 8 | 1 | 3 |
| Weekly | 15 | 10 | 21 | 19 | 26 | 10 | 23 |
| Every two weeks | 11 | 18 | 9 | 15 | 12 | 12 | 26 |
| Monthly | 31 | 37 | 32 | 35 | 30 | 41 | 30 |
| Other | 8 | 16 | 5 | 5 | 4 | 8 | 3 |
| Do not inspect | 8 | 14 | 2 | 6 | 4 | 3 | 1 |
| Other Structures: | | | | | | | |
| Daily | 1 | | 1 | 4 | | | 1 |
| Twice a week | | 2 | 1 | 3 | | 2 | 2 |
| Weekly | 3 | 4 | 6 | 15 | 1 | 6 | 5 |
| Every two weeks | | 10 | 2 | 12 | 3 | 5 | 15 |
| Monthly | 12 | 10 | 11 | 27 | 4 | 39 | 9 |
| Other | 2 | 4 | 2 | 3 | 2 | 6 | 2 |
| Do not inspect | 6 | 8 | 1 | 9 | 1 | 5 | |

--continued

**Pest Management Practices,**
**Percent of Operations Utilizing Practice,**
**All Grains Handled, 2000, Spring and Summer (continued)**

| Practice | States Surveyed | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ND | OH | OK | OR | SD | TX | WA | ALL |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Inspect for Insects: | | | | | | | | |
| Concrete Silos: | | | | | | | | |
| Daily | 1 | 5 | 3 | 6 | 1 | 6 | 5 | 3 |
| Twice a week | 1 | 1 | 6 | | | 4 | | 3 |
| Weekly | 3 | 16 | 14 | 9 | 6 | 13 | 5 | 13 |
| Every two weeks | 6 | 13 | 18 | 12 | 7 | 6 | 19 | 10 |
| Monthly | 13 | 30 | 25 | 3 | 12 | 19 | 35 | 19 |
| Other | 3 | 5 | 2 | 9 | 1 | 7 | 14 | 4 |
| Do not inspect | 4 | 7 | 5 | 12 | 2 | 1 | 2 | 3 |
| Steel Tanks or Bins: | | | | | | | | |
| Daily | | 5 | 4 | 3 | 1 | 5 | 2 | 3 |
| Twice a week | 1 | 1 | 4 | | 2 | 4 | | 3 |
| Weekly | 10 | 13 | 14 | 9 | 27 | 17 | 7 | 17 |
| Every two weeks | 16 | 14 | 18 | 6 | 20 | 12 | 16 | 15 |
| Monthly | 50 | 30 | 26 | 18 | 38 | 32 | 44 | 34 |
| Other | 6 | 2 | 5 | 24 | 5 | 11 | 12 | 6 |
| Do not inspect | 8 | 9 | 7 | 15 | 3 | 5 | 7 | 5 |
| Other Structures: | | | | | | | | |
| Daily | 2 | | | 15 | 2 | 1 | | 1 |
| Twice a week | 1 | | | | 2 | 1 | | 1 |
| Weekly | 8 | 5 | 1 | 6 | 23 | 7 | 7 | 7 |
| Every two weeks | 11 | 2 | | 12 | 13 | 4 | 16 | 7 |
| Monthly | 43 | 3 | 4 | 12 | 29 | 5 | 37 | 16 |
| Other | 3 | | | 18 | 3 | 3 | 7 | 3 |
| Do not inspect | 9 | 2 | 2 | | 5 | 1 | 2 | 3 |

**Pest Management Practices,**
**Percent of Operations Utilizing Practice,**
**All Grains Handled, 2000, Spring and Summer**

| Practice | States Surveyed | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO | ID | KS | MN | MO | MT | NE |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Measure Grain Temperature: | | | | | | | |
| Concrete Silos: | | | | | | | |
| Daily | 2 | | 1 | 2 | 3 | 1 | 6 |
| Twice a week | 3 | | 8 | 1 | 10 | | 3 |
| Weekly | 15 | | 52 | 11 | 16 | 1 | 31 |
| Every two weeks | 7 | 4 | 7 | 3 | 1 | | 11 |
| Monthly | 10 | 2 | 8 | 8 | 4 | 4 | 12 |
| Other | 7 | 4 | 2 | 2 | | 2 | 6 |
| Do not monitor | 4 | 22 | 2 | 14 | 4 | 14 | 3 |
| Steel Tanks or Bins: | | | | | | | |
| Daily | 3 | | 1 | 2 | 4 | 1 | 3 |
| Twice a week | 4 | | 9 | 1 | 10 | 1 | 1 |
| Weekly | 15 | | 34 | 16 | 18 | 4 | 32 |
| Every two weeks | 13 | 16 | 6 | 8 | 6 | 6 | 12 |
| Monthly | 16 | 12 | 16 | 24 | 20 | 15 | 22 |
| Other | 12 | 16 | 3 | 6 | 4 | 10 | 8 |
| Do not monitor | 13 | 53 | 7 | 30 | 25 | 41 | 9 |
| Other Structures: | | | | | | | |
| Daily | 1 | | | 2 | 1 | | 1 |
| Twice a week | | | 4 | 1 | | 1 | 1 |
| Weekly | | | 10 | 9 | | 1 | 8 |
| Every two weeks | 1 | 8 | 2 | 3 | | 3 | 6 |
| Monthly | 7 | 4 | 6 | 18 | 2 | 23 | 8 |
| Other | 8 | 4 | 1 | 3 | | 3 | 4 |
| Do not monitor | 8 | 20 | 2 | 35 | 7 | 32 | 6 |

--continued

**Pest Management Practices,**
**Percent of Operations Utilizing Practice,**
**All Grains Handled, 2000, Spring and Summer (continued)**

| Practice | States Surveyed | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ND | OH | OK | OR | SD | TX | WA | ALL |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Measure Grain Temperature: | | | | | | | | |
| Concrete Silos: | | | | | | | | |
| Daily | 1 | 13 | 2 | | 2 | 12 | | 4 |
| Twice a week | 2 | 8 | 5 | | | 3 | | 4 |
| Weekly | 2 | 24 | 24 | 6 | 5 | 19 | 2 | 20 |
| Every two weeks | 2 | 11 | 15 | | 5 | 3 | 9 | 6 |
| Monthly | 10 | 11 | 13 | 6 | 6 | 6 | 16 | 9 |
| Other | 1 | 1 | 4 | 9 | 1 | 5 | 21 | 3 |
| Do not monitor | 12 | 8 | 12 | 30 | 9 | 8 | 30 | 9 |
| Steel Tanks or Bins: | | | | | | | | |
| Daily | 1 | 10 | 2 | | 2 | 11 | | 3 |
| Twice a week | 3 | 4 | 4 | 3 | 1 | 4 | | 4 |
| Weekly | 6 | 22 | 23 | 3 | 14 | 16 | 2 | 19 |
| Every two weeks | 8 | 11 | 15 | | 13 | 9 | 12 | 10 |
| Monthly | 31 | 10 | 10 | 6 | 26 | 14 | 21 | 18 |
| Other | 9 | 2 | 5 | 15 | 16 | 7 | 21 | 7 |
| Do not monitor | 34 | 15 | 17 | 48 | 23 | 24 | 33 | 22 |
| Other Structures: | | | | | | | | |
| Daily | 3 | | | | 1 | 2 | | 1 |
| Twice a week | 2 | | | | 1 | 2 | | 1 |
| Weekly | 6 | 2 | | 6 | 11 | 9 | | 5 |
| Every two weeks | 4 | 2 | | | 8 | 2 | 12 | 3 |
| Monthly | 28 | 2 | 1 | 9 | 19 | 2 | 19 | 10 |
| Other | 6 | | 2 | 12 | 16 | 3 | 16 | 4 |
| Do not monitor | 28 | 6 | 4 | 33 | 24 | 2 | 23 | 13 |

**Pest Management Practices,**
**Percent of Operations Utilizing Practice,**
**All Grains Handled, 2000, Fall and Winter**

| Practice | States Surveyed | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO | ID | KS | MN | MO | MT | NE |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Inspect for Insects: | | | | | | | |
| Concrete Silos: | | | | | | | |
| Daily | | | 1 | 4 | 3 | 1 | 3 |
| Twice a week | | 2 | 4 | 1 | 8 | | 3 |
| Weekly | 15 | 2 | 23 | 6 | 14 | 4 | 22 |
| Every two weeks | 7 | 8 | 6 | 4 | 1 | 3 | 6 |
| Monthly | 21 | 18 | 35 | 15 | 8 | 12 | 36 |
| Other | 3 | 4 | 8 | 3 | 3 | 2 | 1 |
| Do not inspect | 2 | | 2 | 6 | 2 | | 2 |
| Steel Tanks or Bins: | | | | | | | |
| Daily | 2 | | 1 | 5 | 6 | 2 | 1 |
| Twice a week | | 4 | 4 | 1 | 8 | 1 | 2 |
| Weekly | 13 | 12 | 17 | 17 | 26 | 12 | 24 |
| Every two weeks | 13 | 18 | 5 | 14 | 8 | 14 | 9 |
| Monthly | 35 | 37 | 40 | 38 | 35 | 38 | 45 |
| Other | 7 | 12 | 5 | 5 | 4 | 8 | 4 |
| Do not inspect | 7 | 14 | 4 | 6 | 4 | 2 | 2 |
| Other Structures: | | | | | | | |
| Daily | 1 | | 1 | 4 | | | 1 |
| Twice a week | | 2 | 1 | 2 | | 2 | 1 |
| Weekly | 3 | 4 | 5 | 14 | 1 | 8 | 6 |
| Every two weeks | 1 | 10 | 2 | 11 | 1 | 8 | 4 |
| Monthly | 12 | 10 | 14 | 30 | 4 | 36 | 21 |
| Other | 1 | 6 | 2 | 4 | 2 | 6 | 2 |
| Do not inspect | 4 | 6 | 1 | 9 | 2 | 3 | |

--continued

**Pest Management Practices,**
**Percent of Operations Utilizing Practice,**
**All Grains Handled, 2000, Fall and Winter (continued)**

| Practice | States Surveyed | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ND | OH | OK | OR | SD | TX | WA | ALL |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Inspect for Insects: | | | | | | | | |
| Concrete Silos: | | | | | | | | |
| Daily | 1 | 5 | 2 | 6 | 1 | 3 | 5 | 2 |
| Twice a week | | | 5 | | 1 | 3 | | 2 |
| Weekly | 3 | 16 | 17 | 6 | 5 | 12 | 5 | 13 |
| Every two weeks | 5 | 9 | 18 | 15 | 5 | 5 | 21 | 7 |
| Monthly | 14 | 32 | 27 | 6 | 14 | 24 | 35 | 24 |
| Other | 3 | 5 | 2 | 9 | 1 | 7 | 12 | 4 |
| Do not inspect | 4 | 10 | 2 | 9 | 2 | 2 | 2 | 3 |
| Steel Tanks or Bins: | | | | | | | | |
| Daily | | 5 | 2 | 3 | 1 | 5 | 2 | 2 |
| Twice a week | 1 | | 3 | 3 | 1 | 3 | | 2 |
| Weekly | 11 | 14 | 14 | 6 | 25 | 16 | 7 | 16 |
| Every two weeks | 16 | 8 | 17 | 9 | 18 | 9 | 21 | 12 |
| Monthly | 49 | 34 | 28 | 18 | 43 | 36 | 42 | 38 |
| Other | 7 | 3 | 4 | 21 | 5 | 12 | 14 | 6 |
| Do not inspect | 8 | 10 | 10 | 15 | 3 | 5 | 2 | 6 |
| Other Structures: | | | | | | | | |
| Daily | 2 | | | 15 | 2 | | | 1 |
| Twice a week | 1 | | | 3 | 1 | 1 | | 1 |
| Weekly | 9 | 5 | 1 | 6 | 21 | 5 | 7 | 7 |
| Every two weeks | 10 | 1 | | 12 | 9 | 2 | 19 | 5 |
| Monthly | 43 | 5 | 4 | 12 | 36 | 9 | 37 | 19 |
| Other | 4 | | | 15 | 3 | 3 | 5 | 3 |
| Do not inspect | 10 | 2 | 2 | | 5 | 2 | 2 | 3 |

**Pest Management Practices,**
**Percent of Operations Utilizing Practice,**
**All Grains Handled, 2000, Fall and Winter**

| Practice | States Surveyed | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO | ID | KS | MN | MO | MT | NE |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Measure Grain Temperature: | | | | | | | |
| Concrete Silos: | | | | | | | |
| Daily | 1 | | 1 | 2 | 1 | 1 | 4 |
| Twice a week | 2 | | 4 | | 10 | | 3 |
| Weekly | 13 | | 47 | 11 | 18 | 1 | 32 |
| Every two weeks | 8 | 4 | 9 | 3 | 1 | | 4 |
| Monthly | 13 | 2 | 14 | 8 | 4 | 4 | 19 |
| Other | 4 | 4 | 2 | 2 | | 2 | 6 |
| Do not monitor | 6 | 22 | 2 | 14 | 4 | 14 | 3 |
| Steel Tanks or Bins: | | | | | | | |
| Daily | 2 | | 1 | 2 | 3 | 1 | 1 |
| Twice a week | 3 | | 5 | | 10 | 1 | 1 |
| Weekly | 13 | | 30 | 15 | 17 | 6 | 33 |
| Every two weeks | 15 | 16 | 8 | 8 | 7 | 5 | 6 |
| Monthly | 20 | 12 | 21 | 25 | 21 | 15 | 28 |
| Other | 10 | 12 | 3 | 6 | 4 | 10 | 8 |
| Do not monitor | 13 | 57 | 7 | 31 | 25 | 40 | 9 |
| Other Structures: | | | | | | | |
| Daily | 1 | | | 2 | 1 | 1 | 1 |
| Twice a week | | | 1 | | | 1 | 1 |
| Weekly | | | 9 | 9 | | 1 | 8 |
| Every two weeks | | 8 | 4 | 3 | | 3 | 2 |
| Monthly | 8 | 4 | 7 | 17 | 2 | 23 | 13 |
| Other | 4 | 2 | 1 | 3 | | 3 | 4 |
| Do not monitor | 10 | 22 | 2 | 36 | 7 | 31 | 6 |

--continued

**Pest Management Practices,**
**Percent of Operations Utilizing Practice,**
**All Grains Handled, 2000, Fall and Winter (continued)**

| Practice | States Surveyed | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ND | OH | OK | OR | SD | TX | WA | ALL |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Measure Grain Temperature: | | | | | | | | |
| Concrete Silos: | | | | | | | | |
| Daily | 2 | 13 | 1 | | 2 | 9 | | 3 |
| Twice a week | 1 | 9 | 6 | | | 2 | | 3 |
| Weekly | 3 | 21 | 20 | 6 | 4 | 19 | 5 | 19 |
| Every two weeks | 2 | 13 | 17 | 3 | 5 | 5 | 7 | 7 |
| Monthly | 10 | 11 | 14 | 6 | 7 | 9 | 16 | 11 |
| Other | 1 | 2 | 4 | 12 | 1 | 5 | 21 | 3 |
| Do not monitor | 12 | 8 | 12 | 24 | 9 | 7 | 30 | 9 |
| Steel Tanks or Bins: | | | | | | | | |
| Daily | 2 | 9 | | | 2 | 9 | | 3 |
| Twice a week | 2 | 3 | 4 | 6 | | 4 | | 3 |
| Weekly | 7 | 18 | 21 | 3 | 13 | 17 | 5 | 18 |
| Every two weeks | 7 | 13 | 16 | 3 | 14 | 8 | 12 | 10 |
| Monthly | 30 | 12 | 12 | 9 | 27 | 16 | 21 | 20 |
| Other | 9 | 3 | 5 | 12 | 16 | 7 | 21 | 7 |
| Do not monitor | 34 | 15 | 19 | 42 | 23 | 24 | 30 | 22 |
| Other Structures: | | | | | | | | |
| Daily | 3 | | | | 1 | 2 | | 1 |
| Twice a week | 1 | | | 3 | | 1 | | 1 |
| Weekly | 7 | 2 | | 6 | 9 | 9 | 2 | 5 |
| Every two weeks | 4 | 1 | | 3 | 8 | 2 | 9 | 3 |
| Monthly | 26 | 3 | 1 | 9 | 20 | 4 | 19 | 11 |
| Other | 7 | | 3 | 12 | 16 | 2 | 16 | 4 |
| Do not monitor | 29 | 6 | 4 | 27 | 24 | 2 | 23 | 13 |

**Pest Management Practices,**
**Strategies Used in Determining Fumigation Schedule**
**All Grains Handled, 2000**

| Practice | States Surveyed | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO | ID | KS | MN | MO | MT | NE |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Preset Calendar Date | 4 | | 15 | 5 | 22 | 13 | 4 |
| Bin Samples | 60 | 24 | 57 | 32 | 40 | 13 | 49 |
| Scheduled with other Handling Operations | 6 | | 24 | 9 | 12 | 13 | 9 |
| Insect Trap Counts | | 16 | 2 | | 10 | | 5 |
| Visual Grain Inspection | 84 | 80 | 66 | 64 | 67 | 67 | 80 |
| Customer Request | | 16 | 1 | 5 | | 7 | 2 |
| Other | 4 | 8 | 3 | 27 | 5 | | 1 |

**Pest Management Practices,**
**Strategies Used in Determining Fumigation Schedule**
**All Grains Handled, 2000**

| Practice | States Surveyed | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ND | OH | OK | OR | SD | TX | WA | ALL |
| | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* | *Pct. of Operations* |
| Preset Calendar Date | 2 | 10 | 17 | | | 5 | 6 | 9 |
| Bin Samples | 55 | 21 | 46 | 30 | 24 | 41 | 33 | 43 |
| Scheduled with other Handling Operations | 3 | 2 | 19 | 20 | 18 | 29 | 12 | 15 |
| Insect Trap Counts | 9 | 3 | 11 | 10 | 2 | 5 | 15 | 6 |
| Visual Grain Inspection | 79 | 68 | 70 | 70 | 90 | 59 | 85 | 73 |
| Customer Request | 7 | 3 | 1 | 20 | 2 | 3 | 9 | 3 |
| Other | | 16 | 2 | | 1 | 3 | 3 | 4 |

**Survey Procedures:** Operations chosen from the NASS List Sampling Frame were known to or expected to provide off-farm storage for wheat. The sample was selected with probability proportional to size in terms of the amount of wheat reported by the operation on one of NASS's quarterly Grain Stocks Surveys conducted in 2000.

**Estimation Procedures:** The chemical applications data, reported by product name or trade name, were reviewed within State and across States for reasonableness and consistency. This review compared reported data with manufacturers' recommendations and with data from other operations using the same product. Following this review, product information was converted to active ingredient level. The chemical usage estimates in this publication are of those active ingredients.

Detailed data within a table may not multiply across or add down due to independent rounding of the published values.

**Reliability:** The probability nature of the survey provides for expansion of data so estimates are statistically representative of chemical use on the targeted commodities in the surveyed States. The reliability of these survey results are affected by sampling variability and non-sampling errors.

Non-sampling errors are errors that occur during a survey process, and unlike sampling variability, are difficult to measure. They may be caused by interviewers failing to follow instructions, poorly worded questions, non-response, problematic survey procedures, or data handling between collection and publication. In this survey, procedures and analyses were carried out in a consistent and orderly manner to minimize the occurrence of these types of errors.

Variability for estimates of volume of the commodity handled will be higher than the variability for estimates of application rates. This is because application rates have a narrower range of responses and the manufacturers' recommended rates are generally followed.

Sampling variability of the estimates also differs by chemical and crop. In general, the more often the chemical was applied, the smaller the sampling variability. For example, estimates for use of a commonly used product, such as aluminum phosphide on corn in Illinois, will exhibit less variability than a rarely used or reported product.

## Terms and Definitions

**Active ingredient:** The active ingredient is the specific chemical which kills or controls the target pests. Usage data are reported by pesticide product and are converted to an amount of active ingredient.

**Aeration controller:** An automatic (usually computer-based) system that determines the optimum running time (considering humidity and temperature)for aeration fans on the grain bins. They can usually be set for drying or storage mode

**Agricultural chemicals:** The phrase agricultural chemicals refers to the active ingredients in pesticides.

**Application rates:** The application rates refer to the average number of pounds of a pesticide active ingredient applied to a volume of product. Rate per application is the average number of pounds applied in one application. Rate per marketing year is the average number of pounds applied counting multiple applications. Number of applications is the average number of times a treated volume receives a specific agricultural chemical.

**Common name:** The common name is an officially recognized name for an active ingredient. This report shows active ingredient by common name.

**Core bins after filling:** When grain is placed into a bin, it is usually filled from the top. Because grain contains other things (including broken pieces of grain), smaller particles (called fines) tend to concentrate in the center of the bin. This finer material compacts, restricting airflow which in turn affects grain temperatures and thus pests. For this reason, it is recommended that a portion of grain is extracted from the bottom center of the bin. This core can then be reloaded onto the top and spread over the surface to distribute the fines evenly.

**Deep bin sampler:** Usually a vacuum type device that allows one to reach deeply into a grain bin and sample grain that is normally out of reach to typical probe samplers.

**Fumigant:** A substance or mixture of substances which produce a gas vapor, fume, or smoke intended to destroy insects, rodents, or bacteria.

**Grain spreader:** When grain is loaded into the grain bin, it can first be put through a spreader which swings the grain out from the fall line and fills the bin uniformly rather than forming a cone in the center of the bin.

**Marketing year:** A marketing year refers to the period immediately following harvest of the crop through the marketing or disposition of the crop.

**Pesticides:** As defined by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), pesticides include any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest, and any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

**Postharvest:** After the commodity is harvested from the field, any subsequent activity is termed postharvest. Postharvest chemical usage refers to chemical applications after the commodity is taken from the field or orchard.

**Processor:** Processors actually change the form of the commodity. These firms may have storage facilities.

**Trade name:** A trademark name given to a specific formulation of a pesticide product. A formulation contains a specific concentration of the active ingredient, carrier materials, and other ingredients such as emulsifiers and wetting agents. Some formulations as in the case of pre-mixes, can contain more than one active ingredient.

**Volume handled:** The volume of a commodity handled by the market segment. In this release, it is the total amount of a commodity summarized in the particular table that passed through the firms.

**Volume treated:** The amount that represents the percentage of volume handled receiving one or more applications of a specific agricultural chemical. This report does not contain total quantity treatments. However, total quantity treatments can be calculated by multiplying the total volume handled by the percent of volume treated and the average number of applications.

## Trade Names, Common Names, and Classes

The following is a list of common name, associated class and trade name of active ingredients in this publication. The classes are herbicides (H), insecticides (I), fungicides (F), and other chemicals (O). This list is provided as an aid in reviewing the data. Pre-mixes are not cataloged. The list may not be complete for all postharvest chemicals used on wheat. NASS does not mean to imply use of any specific trade name.

| Class : | Common Name : | Trade Name |
|---|---|---|
| I | Aluminum phosphide | several |
| I | Carbon dioxide | Carbon dioxide |
| F | Carboxin | Vitavax |
| I | Chlorpyrifos-methyl | Reldan |
| I | Cyfluthrin | Tempo 2 |
| F | Difenoconazole | Dividend |
| F | Imazilil | Flo-Pro |
| I | Imidacloprid | Gaucho |
| I | Lindane | several |
| I | Malathion | several |
| F | Metalaxyl | Dividend |
| I | Methyl bromide | several |
| F | Pentachloronitrobenzene | PCNB Seed Coat |
| I | Phosphine gas | Eco2Fime |
| F | Propionic acid | Propionic acid |
| I | Silica gel | Protect-it |
| I | Silicon dioxide | several |
| F | Tebuconazole | several |
| I | Thiamethoxam | Adage, Cruiser |
| F | Thiram | Thiram, Vitavax |

**2001 WHEAT POSTHARVEST**
**CHEMICAL USE SURVEY**

| VERSION | POID | SUBT. | T-TYPE | TABLE | LINE |
|---|---|---|---|---|---|
| 1 | _ _ _ _ _ _ _ _ _ _ | _ _ | 0 | 000 | 00 |

| CONTACT RECORD | | |
|---|---|---|
| DATE | TIME | NOTES |
| | | |
| | | |
| | | |
| | | |

**RESPONSE CODES**

3 - COMPLETED
4 - SCREENOUT
5 - NO WHEAT HANDLED/ RECEIVED
8 - REFUSAL
9 - INACCESSIBLE

**OFFICE USE** 001

OPTIONAL 002

**INTRODUCTION**
[*Introduce yourself, and ask for the operator. Rephrase in your own words.*]

We are collecting information on chemical use and need your help to make the information as accurate as possible. Authority for collection of information on the Wheat Postharvest Chemical Use Survey is Title 7, Section 2204 of the U.S. Code. This information will be used for analysis and to compile and publish estimates for your state and the United States. Response to this survey is confidential and voluntary.

We encourage you to refer to your operation records during the interview.

**BEGINNING TIME** [*MILITARY*] . . . . . 003 _ _ _ _

Name
Address

Phone (_____)

☐ [*Name, address and partners verified and updated if necessary.*]

1. Did this operation (*as listed on the label*) handle/receive any spring, winter and/or durum wheat from June 1, 2000 to May 31, 2001?

☐ **YES -** [*Go to page 3.*]

☐ **NO -** [*Go to page 2.*]

**ADJUSTMENT FACTOR** 005

## CHANGE IN OPERATOR

- **[*Complete this section only if item 1 on the front page is answered "No".*]**

1. Has the operation named on the label been **sold, rented, or turned over** to someone else?

   ☐ **YES** - [*Cont.*] ☐ **NO** →

   a. Will the operation handle or receive wheat or other crops at any of its facilities in 2001?

   ☐ **YES** ☐ **DON'T KNOW** ☐ **NO**

   [***Regardless of answer above, write a note to explain the situation, then go to back page Conclusion.***]

2. Please provide the name and address of the operation that has taken over the business you formerly operated:

   Operation Name:

   Operator Name:

   Address:

   City: State: Zip:

   Phone:

**NOTES and CALCULATIONS:**

Now I would like to ask about the spring, winter and/or durum wheat handled/received from June 1, 2000 to May 31, 2001.

Please use your records to help us get an accurate record of wheat receipts.

1. What was the total quantity of **wheat** handled/received from June 1, 2000 to May 31, 2001 on this operation? . . . . . .

| |
|---|
| **1 BUSHEL (45 lbs)** |
| **4 SHORT TON (2,000 lbs)** |
| **5 CWT. (100 lbs)** |
| **6 POUNDS** |
| **7 METRIC TON (2,204.6 lbs)** |
| **8 OTHER** |

| QUANTITY | UNIT | If "8" enter POUNDS/UNIT |
|---|---|---|
| 200 ___,___,___.__ | 201 | 202 .__ |

2. Did **ALL** wheat received from June 1, 2000 to May 31, 2001 receive a postharvest chemical application?

☐ **YES** - [*Go to page 4.*] ☐ **NO** - [*Continue.*]

3. Of the item 1 wheat, how much wheat **DID NOT** receive postharvest chemical applications while in storage, on the ground, in barges, ships, railcars, or on trucks?

| | QUANTITY NOT TREATED | OR | PERCENT OF TOTAL NOT TREATED |
|---|---|---|---|
| a. Wheat? . . . . . | 206 ___,___,___.___ | | 207 |

**ENUMERATOR NOTE:** [*If **NO** postharvest chemicals were applied go to Section **C**, page 6. If postharvest chemicals were applied, go to page 4.*]

**COMPLETION CODE for CHEMICAL EDIT TABLE**

| | |
|---|---|
| 1 - Incomplete / Refusal<br>3 - Valid Zero | 300 |

Now I have some questions about postharvest chemical data on **wheat** handled, stored, or processed by your operation from June 1, 2000 to May 31, 2001. I will be asking for chemical products used, quantity treated, total amount of product applied, and timing and method of application. Please use your records to answer the questions as accurately as possible and to help make sure we do not miss any products used. Include wheat treated while in storage or on the ground, or in barges, ships, rail cars, or on trucks.

**OFFICE USE**

| T-TYPE | TABLE | LINE | LINES IN TABLE |
|---|---|---|---|
| 3 | 001 | 99 | 399 |

| STORAGE CODES FOR COLUMN 2 | |
|---|---|
| 5 | In Bound |
| 6 | During Binning |
| 7 | While Stored |
| 8 | Out Bound |

| NOTES | LINE | 1 What product was applied? (*In Respondent Booklet*) (a) COMMON OR TRADE NAME | 1 What product was applied? (*In Respondent Booklet*) (b) PRODUCT CODE | 2 When was this product used? [*Enter code from above.*] | 3 What was the total quantity of wheat treated with this chemical (*in column 1*)? |
|---|---|---|---|---|---|
| | 01 | | 302 | 303 | 304 . __ |
| | 02 | | 302 | 303 | 304 . __ |
| | 03 | | 302 | 303 | 304 . __ |
| | 04 | | 302 | 303 | 304 . __ |
| | 05 | | 302 | 303 | 304 . __ |
| | 06 | | 302 | 303 | 304 . __ |
| | 07 | | 302 | 303 | 304 . __ |
| | 08 | | 302 | 303 | 304 . __ |
| | 09 | | 302 | 303 | 304 . __ |

[*For pesticides not listed in Respondent Booklet, specify--*]

| LINE NO. | EPA No. or Trade name and Formulation | Form Purchased (Liquid or Dry) | Where Purchased [*Ask only if EPA No. cannot be reported.*] |
|---|---|---|---|

**UNIT CODES FOR COLUMN 4**
1 - BUSHEL (*60 lbs*)
4 - SHORT TON (*2,000 lbs*)
5 - CWT. (*100 lbs*)
6 - POUNDS
7 - METRIC TON (*2,204.6 lbs*)
8 - OTHER

**UNIT CODES FOR COLUMN 7**
1 POUNDS
12 GALLONS
13 QUARTS
14 PINTS
15 OUNCES
30 GRAMS
40 KILOGRAMS
41 LITERS
45 PELLETS
46 TABLETS
50 OTHER (*Specify* _____)

**APPLICATION CODES FOR COLUMN 8**
3 - DIRECT SPRAY
5 - TOP DRESS
7 - MIXING PELLETS/TABLETS
9 - DIRECT POWDERING
10 - RE-CIRCULATION
11 - OTHER (*Specify* _____)

| LINE | 4 [*Enter unit code from above.*] | 5 **If column 4 unit equals "8", enter pounds per unit.** | 6 **What was the total amount of formulated product applied to the** (*column 3*) **amount of wheat?** | 7 [*Enter unit code from above.*] | 8 **What was the method used to apply this product?** **CODE** |
|---|---|---|---|---|---|
| 01 | 305 | 306 . ___ | 307 . ___ ___ | 308 | 309 |
| 02 | 305 | 306 . ___ | 307 . ___ ___ | 308 | 309 |
| 03 | 305 | 306 . ___ | 307 . ___ ___ | 308 | 309 |
| 04 | 305 | 306 . ___ | 307 . ___ ___ | 308 | 309 |
| 05 | 305 | 306 . ___ | 307 . ___ ___ | 308 | 309 |
| 06 | 305 | 306 . ___ | 307 . ___ ___ | 308 | 309 |
| 07 | 305 | 306 . ___ | 307 . ___ ___ | 308 | 309 |
| 08 | 305 | 306 . ___ | 307 . ___ ___ | 308 | 309 |
| 09 | 305 | 306 . ___ | 307 . ___ ___ | 308 | 309 |
| 10 | 305 | 306 . ___ | 307 . ___ ___ | 308 | 309 |

## Enumerator Notes:

| T-TYPE | TABLE | LINE |
|---|---|---|
| 0 | 000 | 00 |

Now I have some questions about pest management practices you may have used at your facilities. Include **ALL GRAINS** handled.

**1. Did you use a–**

CODE

a. power probe?
☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . 650

b. aeration controller?
☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . 651

c. phosphine pellet dispenser?
☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . 652

d. temperature cable in bins?
☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . 653

e. grain spreader in bins?
☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . 654

f. re-circulation fumigation device?
☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . 655

g. deep bin sampler?
☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . 656

h. protein analyzer?
☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . 657

2. How often is your grain inspected for insects in your (*concrete silos, steel tanks or bins, or other structures*)(*including wood bins*) during the spring/summer and fall/winter months?

| | SPRING/SUMMER | FALL/WINTER |
|---|---|---|
| Concrete Silos. . . . . | 658 | 659 |
| Steel Tanks or Bins. . . . . | 660 | 661 |
| Other Structures (*Include wood bins.*). . . . . | 662 | 663 |

**1 DAILY**
**2 TWICE A WEEK**
**3 WEEKLY**
**4 EVERY 2 WEEKS**
**5 MONTHLY**
**6 OTHER** - (*Specify*_____)
**7 DO NOT MONITOR**
**8 DO NOT HAVE THIS STRUCTURE**

3. How often do you measure grain temperature in your (*concrete silos, steel tanks or bins, or other structures*) (*including wood bins*) during the spring/summer and fall/winter months?

| | SPRING/SUMMER | FALL/WINTER |
|---|---|---|
| Concrete Silos. . . . . | 664 | 665 |
| Steel Tanks or Bins. . . . . | 666 | 667 |
| Other Structures (*Include wood bins.*). . . . . | 668 | 669 |

**1 DAILY**
**2 TWICE A WEEK**
**3 WEEKLY**
**4 EVERY 2 WEEKS**
**5 MONTHLY**
**6 OTHER** - (*Specify* _____)
**7 DO NOT MONITOR**
**8 DO NOT HAVE THIS STRUCTURE**

4. Which practices do you use at storage facilities–

**Did you–**

| | | CODE |
|---|---|---|
| a. sweep empty bins? | ☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . | 670 |
| b. hose down empty bins? | ☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . | 671 |
| c. fumigate empty bins? | ☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . | 672 |
| d. pick up spilled grain? | ☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . | 673 |
| e. control vegetation around bins? | ☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . | 674 |
| f. clean aeration ducts? | ☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . | 675 |
| g. core bins after filling? | ☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** . . . . . | 676 |

5. Did you do any other cleaning activities besides the ones listed above to your storage facilities?

☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** - [*Go to* 677

a. What did you do? [*Record responses below.*]

| OFFICE USE |
|---|
| 678 |
| 679 |
| 680 |
| 681 |

6. Did you fumigate grain?

| CODE |
|---|
| 682 |

☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO** - [*Go to*

a. What was the strategy(ies) you used to decide when to fumigate grain? (*Enter up to two strategies*.)

| | |
|---|---|
| **1** | **PRESET CALENDAR DATE** |
| **2** | **BIN SAMPLES** |
| **3** | **SCHEDULED WITH OTHER HANDLING OPERATIONS** |
| **4** | **INSECT TRAP COUNTS** |
| **5** | **VISUAL GRAIN INSPECTION** |
| **6** | **CUSTOMER REQUEST** |
| **7** | **OTHER - (Describe_____)** |

. . . . . 683 684

**COMPLETION CODE for PEST MANAGEMENT SECTION**

| | |
|---|---|
| 1 Incomplete/Refusal | 500 |

## CONCLUSION

**SURVEY PUBLICATIONS**

That completes the survey. Would you like to receive a free copy of the results when they are published?

**CODE**

☐ **YES** - [*Enter code 1.*] ☐ **NO** . . . . . 023

[*Thank the respondent then review this questionnaire.*]

**RECORDS USE**

Did respondent use operation records to report chemical data?

☐ **YES** - [*Enter code 1.*] ☐ **NO** . . . . . 024

**ENDING TIME** [*MILITARY*] . . . . . 025 __ __ __ __

**OFFICE USE - TIME IN HOURS**

026 .

**SUPPLEMENTS USED**

**NUMBER**

Record the total number of pesticide supplements used to complete this interview. . . . . 028

**RESPONDENT**

| | |
|---|---|
| **1** | **OPERATOR/MANAGER OR PARTNER** |
| **2** | **BOOKKEEPER** |
| **3** | **OTHER** |

. . . . . **CODE** 029

**Respondent's name:** _____

(*Phone*) _____

**ENUMERATOR** _____ . . . . . **ENUMERATOR ID** 030

**DATE** . . . . . **MM DD YY** 031 __ __ / __ __ / 01

**OFFICE USE EVALUATION**

032

## Report Features

**Released March 13, 2002, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, U.S. Department of Agriculture. For information on "Agricultural Chemical Usage Postharvest Applications-Wheat" call Michelle Radice at (202) 690-2284, office hours 7:30 a.m. to 4:00 p.m. ET.**

The next **"Agricultural Chemical Usage: Postharvest Applications"** will be released during the spring of 2003. This report will cover the use of postharvest chemicals used on apples and pears during the 2001 marketing year.

Listed below are persons within the National Agricultural Statistics Service to contact for additional information.

| | |
|---|---|
| Michelle Radice, Environmental Statistician | (202) 690-2284 |
| Norman Bennett, Head, Environmental and Demographics Section | (202) 720-0684 |
| Linda Hutton, Chief, Environmental, Economics and Demographics Branch | (202) 720-6146 |

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### ASSISTANCE

For **assistance** with general agricultural statistics or further information about NASS or its products or services, contact the **Agricultural Statistics Hotline** at **800-727-9540**, 7:30 a.m. to 4:00 p.m. ET, or e-mail: **nass@nass.usda.gov.**