



Summary of Four Pesticide Use Surveys in Minnesota (1996 to 2000)

Introduction and Methods

The purpose of this report is to provide a compilation of pesticide use data, including previously unpublished data, collected from surveys of farming practices in four separate Minnesota locations from 1996 to 2000. Data was collected by the Minnesota Department of Agriculture (MDA) as part of comprehensive surveys designed by the MDA to get a clear understanding of existing farm practices regarding agricultural inputs such as fertilizers, manures and pesticides. The survey mechanism used is a diagnostic tool called the Farm Nutrient Management Assessment Process (FaNMAP).¹ Over the years, FaNMAP efforts have resulted in hundreds of farmers volunteering two to four hours of their time to share information about their farming operations. Results from surveys have been used to design focused water quality educational programs for nutrients and pesticides. Data collected can also be used as a baseline to assist in determining the rate of adoption of voluntary Best Management Practices (BMPs) for a variety of farm inputs and operator behaviors.

FaNMAP data from four survey projects was used to evaluate the kinds of pesticides and corresponding application rates used in the production of several major crops in Minnesota. The data was collected to help fulfill the MDA requirement to monitor pesticide use (Minn. Stat. § 18B.064).² While this requirement is fulfilled in several ways (see <http://www.mda.state.mn.us/appd/pesticides/pesticideuse.htm>), the survey results in this report provide additional detail to statewide and regional information collected annually by the MDA Agricultural Statistics Division.

In 1996, MDA modified FaNMAP to include questions related to pesticide use. This report analyzes a combined 36,000 acres in East-Central or Southeast Minnesota from 1996 to 2000. Table 1 details the location, year and size of each survey. Figure 1 shows the relative location within the state of each survey project. These FaNMAP surveys included questions covering nutrient and pesticide management practices, cropping

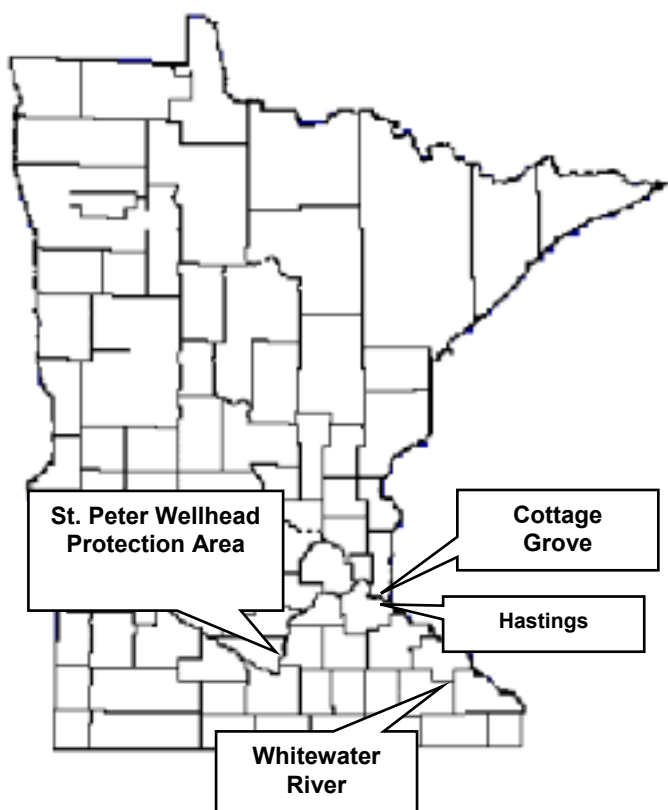
¹ For more information on FaNMAP, visit the MDA website at <http://www.mda.state.mn.us/appd/ace/fanmap.htm>

² The Minnesota Department of Agriculture (MDA) is the lead state agency for all aspects of pesticide and fertilizer environmental and regulatory functions. These authorities are described in [Minnesota Statutes §§ 18B, 18C, 18D and 103H](#), including authorities and requirements to monitor pesticide use.

histories, and evaluations of nutrient best management practice adoption on one or more fields within a farming operation.

| Table 1. MDA surveyed acres for pesticides. | | | |
|--|---------------|-------------|---------------|
| Project | County | Year | Acres |
| Saint Peter Wellhead Protection Area | Nicollet | 1996 | 4,534 |
| Whitewater River Study Area | Olmsted | 1998 | 6,527 |
| Hastings Area Nitrate Study | Dakota | 2000 | 16,135 |
| Cottage Grove Area Nitrate Study | Washington | 2000 | 8,968 |
| Totals | ----- | ---- | 36,164 |

Figure 1. Location of FaNMAP pesticide use survey projects



A summary of project-specific information is provided below:

St. Peter Wellhead Protection Area (1996): A total of 21 farm operators, covering 4,534 acres, were interviewed and approximately 90% of the farmland in the St. Peter Wellhead Protection Area was included in the survey. For information specific to the St. Peter Wellhead Protection Area survey project, visit the MDA website at <http://www.mda.state.mn.us/appd/ace/fanmapstpeter.pdf>

Whitewater River (1998): A total of 22 farm operators were interviewed and approximately 40% of the farmland in the watershed area was included in the survey. A total of 6,527 acres of farmland and pasture were inventoried in the Middle Fork of the Whitewater River Watershed survey project. For information specific to the Whitewater River survey project, visit the MDA website at <http://www.mda.state.mn.us/appd/ace/fanmapfork.pdf>

Hastings (2000): The Hastings FaNMAP was conducted as part of Dakota County’s Hastings Area Nitrate Study. A total of 42 farm operators participated in the study and

approximately 21% of farmland in the Hastings area was included in the survey. Over of 16,000 acres of farmland was inventoried. Dakota County estimates there are 78,000 crop acres in the study area. For information specific to the Hastings Area survey project, visit the MDA website at <http://www.mda.state.mn.us/appd/ace/fanmaphastings.pdf>

Cottage Grove (2000): A total of 39 farm operators were interviewed and approximately 65% of farmland was included in the survey project. A total of 8,968 acres of farmland was inventoried for the project. Aerial photographs provided by the Washington County Farm Service Agency, indicated there are approximately 13,700 crop acres in the study area. For information specific to the Cottage Grove survey project, visit the MDA website at <http://www.mda.state.mn.us/appd/ace/fanmapcottage.pdf>

Results

Corn and soybean acreage accounted for the majority of pesticide applications. Pesticides were applied to over 95% of the major crops found in the study sites. Table 2 details crop acres (i.e., acres planted to crops) and pesticide applied acres (i.e., acres to which pesticides were actually applied).

| Table 2. MDA surveyed acres for crops and pesticides applied. | | | |
|--|-------------------|--------------------------------|---|
| Crop Grown | Crop Acres | Pesticide Applied Acres | Percent of Acres Pesticide Applied |
| Field Corn | 15,734 | 15,700 | 99% |
| Soybeans | 11,702 | 11,190 | 96% |
| Sweet Corn | 1,276 | 1,206 | 95% |
| Potato | 1,150 | 1,150 | 100% |
| Seed Corn | 1,126 | 1,126 | 100% |
| Peas | 1,088 | 1,088 | 100% |
| Other | 5,177 | 919 | 18% |
| Totals | 36,164 | 32,379 | 90% |

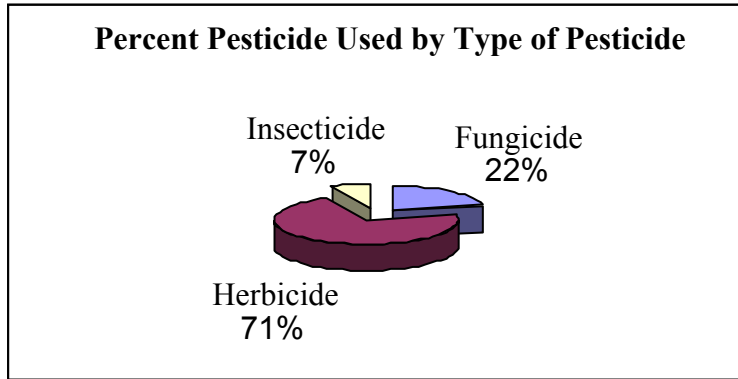
Survey data is summarized by active ingredient (AI). Surveyed farmers applied 126 different products containing 70 separate AIs as shown in Table 3. A total of 71,903 pounds of AI were applied across the 32,379 acres of surveyed cropland.

| Table 3. Pounds of pesticide applied to 32,379 acres surveyed in four Minnesota locations (1996-2000). | | | |
|---|---------------|--------------------------|---------------|
| Active Ingredient | Pounds | Active Ingredient | Pounds |
| Chlorothalonil | 14,267 | Nicosulfuron | 74 |
| Acetochlor | 10,336 | Carbofuran | 57 |
| Metolachlor & s-Metolachlor | 8,766 | Dimethoate | 56 |
| Atrazine | 8,392 | DCPA | 45 |
| Glyphosate | 5,105 | Flufenacet | 39 |
| EPTC | 4,735 | Malathion | 39 |
| Pendimethalin | 4,544 | Imazamox | 36 |
| Phorate | 2,570 | Fluazifop-p-butyl | 33 |
| Terbufos | 1,727 | Rimsulfuron | 30 |
| Bentazon | 1,430 | Primisulfuron | 27 |
| Dicamba | 1,420 | Captan | 24 |
| Trifluralin | 913 | Clethodim | 24 |
| Clopyralid | 639 | Permethrin | 23 |
| Cyanazine | 587 | Acephate | 21 |
| Metribuzin | 586 | Fludioxonil | 19 |
| Imazethapyr | 485 | Cyfluthrin | 17 |
| Clomazone | 479 | Lambda-cyhalothrin | 16 |
| 2,4-D | 473 | Imazapyr | 14 |
| Alachlor | 429 | Quizalofop-p-ethyl | 12 |
| Thiophanate-methyl | 427 | Halosulfuron-methyl | 11 |
| Sethoxydim | 420 | Fenoxaprop-p-ethyl | 11 |
| Copper | 303 | Carbaryl | 10 |
| Diquat | 288 | Endosulfan | 8 |
| Glufosinate-ammonium | 247 | Lactofen | 4 |
| Flumetsulam | 235 | Prosulfuron | 4 |
| Azoxystrobin | 232 | Esfenvalerate | 4 |
| Metalaxyl | 220 | Benomyl | 4 |
| Ethalfuralin | 166 | Cloransulam-methyl | 2 |
| Chlorpyrifos | 146 | Simazine | 2 |
| Dimethenamid | 134 | Flumiclorac pentyl | 4 |
| Bromoxynil | 127 | Thifensulfuron | 1 |
| Tebupirimphos | 112 | Imidacloprid | 1 |
| Fomesafen | 108 | Dimethylamine | 1 |
| Tefluthrin | 102 | Diethanolamin | 1 |
| Acifluorfen | 81 | Thifensulfuron methyl | <1 |
| Total Pounds Active Ingredient | | | 71,903 |

| Table 4. Number of surveyed acres receiving specific active ingredients in four Minnesota locations (1996-2000). | | | |
|---|--------------|--------------------------|---------------|
| Active Ingredient | Acres | Active Ingredient | Acres |
| Atrazine | 10,688 | Halosulfuron-methyl | 567 |
| Acetochlor | 6,412 | Clomazone | 556 |
| Glyphosate | 5,971 | Fludioxonil | 550 |
| Dicamba | 5,670 | Acifluorfen | 508 |
| Flumetsulam | 5,651 | Bromoxynil | 466 |
| Pendimethalin | 5,349 | Fluazifop-p-butyl | 316 |
| Clopyralid | 5,344 | Clethodim | 292 |
| Imazethapyr | 4,970 | Fenoxaprop-p-ethyl | 281 |
| Nicosulfuron | 4,641 | Cloransulam-methyl | 267 |
| Metolachlor and s-Metolachlor | 4,495 | Prosulfuron | 247 |
| Rimsulfuron | 2,630 | Ethalfuralin | 246 |
| Bentazon | 2,366 | Quizalofop-p-ethyl | 220 |
| Sethoxydim | 2,271 | Alachlor | 191 |
| 2,4-D | 1,696 | Permethrin | 158 |
| Terbufos | 1,517 | Chlorpyrifos | 132 |
| Metribuzin | 1,468 | Esfenvalerate | 125 |
| Primisulfuron | 1,283 | Dimethenamid | 115 |
| Cyfluthrin | 1,254 | Flumiclorac pentyl | 105 |
| Metalaxyl | 1,245 | Thifensulfuron methyl | 101 |
| Trifluralin | 1,232 | Copper | 85 |
| Phorate | 1,183 | Dimethoate | 75 |
| EPTC | 1,165 | Flufenacet | 65 |
| Azoxystrobin | 1,150 | Carbofuran | 57 |
| Chlorothalonil | 1,150 | Acephate | 55 |
| Diquat | 1,150 | Lactofen | 35 |
| Imazamox | 1,134 | Malathion | 35 |
| Imazapyr | 1,048 | Benomyl | 5 |
| Tefluthrin | 990 | Captan | 5 |
| Tebupirimphos | 954 | Carbaryl | 5 |
| Lambda-cyhalothrin | 809 | DCPA | 5 |
| Cyanazine | 790 | Endosulfan | 5 |
| Glufosinate-ammonium | 750 | Diethanolamin | 4 |
| Thiophanate-methyl | 605 | Dimethylamine | 4 |
| Fomesafen | 581 | Imidacloprid | 4 |
| Thifensulfuron | 576 | Simazine | 1 |
| Total Acres Receiving Active Ingredients | | | 96,076 |
| (Totals exceed total acreage shown in Tables 1 and 2 because more than one AI can be applied to the same field. There was an average of 2.96 AIs applied to each acre receiving pesticides.) | | | |

Herbicides accounted for 71% of all pesticides used on all crops and surveyed acres, as shown in Figure 2.

Figure 2. Percent pesticide used on all crops and surveyed acres by type of pesticide.



Pesticide use by type of pesticide across all surveyed **corn** acres is described in Table 5.

| Survey Project and Type of Pesticide | Corn Acres | Pesticide Applied Acres | Percent of Acres Treated | Total AI Applied (lbs) |
|--------------------------------------|------------|-------------------------|--------------------------|------------------------|
| St. Peter Wellhead (1996) | 2,328 | | | |
| Herbicide | | 2,328 | 100% | 8,104 |
| Insecticide | | 218 | 09% | 9 |
| Fungicide | | 0 | 00% | 0 |
| Whitewater River (1998) | 3,069 | | | |
| Herbicide | | 3,069 | 100% | 8,263 |
| Insecticide | | 1,475 | 48% | 343 |
| Fungicide | | 0 | 00% | 0 |
| Hastings (2000) | 6,771 | | | |
| Herbicide | | 6,761 | 99% | 8,743 |
| Insecticide | | 1,520 | 22% | 1,399 |
| Fungicide | | 0 | 00% | 0 |
| Cottage Grove (2000) | 3,567 | | | |
| Herbicide | | 3,427 | 96% | 7,257 |
| Insecticide | | 305 | 09% | 94 |
| Fungicide | | 0 | 00% | 0 |
| Combined Project Data | 15,735 | | | |
| Herbicide | | 15,585 | 99% | 32,367 |
| Insecticide | | 3,518 | 22% | 1,845 |
| Fungicide | | 0 | 00% | 0 |

Tables 6 through 9 describe pesticide use by active ingredient on surveyed **CORN** acres for the four survey projects.

| Table 6. Pesticide use by active ingredient for CORN acres – ST. PETER WELLHEAD (1996). | | | | | | |
|--|----------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Corn Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| St. Peter Wellhead | 2,328 | | | | | |
| Acetochlor | 1,638 | 70.4% | 1.00 | 1.66 | 1.66 | 2,721 |
| EPTC | 640 | 27.5% | 1.00 | 4.04 | 4.04 | 2,588 |
| Metolachlor & s-Metolachlor | 442 | 19.0% | 1.00 | 2.57 | 2.57 | 1,135 |
| Atrazine | 804 | 34.5% | 1.00 | 0.69 | 0.69 | 556 |
| Dicamba | 1,164 | 50.0% | 1.00 | 0.47 | 0.47 | 544 |
| Pendimethalin | 218 | 9.4% | 1.00 | 1.24 | 1.24 | 270 |
| 2,4-D | 1,020 | 43.8% | 1.00 | 0.20 | 0.20 | 199 |
| Flumetsulam | 653 | 28.0% | 1.00 | 0.08 | 0.08 | 51 |
| Clopyralid | 546 | 23.5% | 1.00 | 0.06 | 0.06 | 34 |
| Permethrin | 52 | 2.2% | 1.00 | 0.14 | 0.14 | 7 |
| Nicosulfuron | 248 | 10.7% | 1.00 | 0.02 | 0.02 | 4 |
| Lambda-cyhalothrin | 166 | 7.1% | 1.00 | 0.01 | 0.01 | 1 |
| Primisulfuron | 30 | 1.3% | 1.00 | 0.02 | 0.02 | 1 |
| Prosulfuron | 30 | 1.3% | 1.00 | 0.02 | 0.02 | 1 |

**Table 7. Pesticide use by active ingredient for CORN acres –
COTTAGE GROVE (2000).**

| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Appli- cations | Mean Rates | | Total Applied Crop Year (lbs) |
|--|---------------|--------------------|-------------------------------------|---------------------------------------|-----------------------------------|---|
| | Corn Acres | Percent Treated | | Rate per Appli- cation (lbs) | Rate per Crop Year (lbs) | |
| Cottage Grove | 3,567 | | | | | |
| Metolachlor & s- Metolachlor | 1033 | 29.0% | 1.00 | 2.10 | 2.10 | 2174 |
| Atrazine | 2226 | 62.4% | 1.20 | 0.81 | 0.97 | 2153 |
| Acetochlor | 859 | 24.1% | 1.00 | 1.06 | 1.06 | 908 |
| EPTC | 189 | 5.3% | 1.00 | 4.20 | 4.20 | 794 |
| Pendimethalin | 486 | 13.6% | 1.00 | 0.85 | 0.85 | 413 |
| Cyanazine | 297 | 8.3% | 1.00 | 0.73 | 0.73 | 218 |
| Glufosinate- ammonium | 450 | 12.6% | 1.00 | 0.34 | 0.34 | 153 |
| Dicamba | 874 | 24.5% | 1.00 | 0.16 | 0.16 | 143 |
| Clopyralid | 1247 | 35.0% | 1.00 | 0.08 | 0.08 | 94 |
| Chlorpyrifos | 75 | 2.1% | 1.00 | 1.20 | 1.20 | 90 |
| Bromoxynil | 200 | 5.6% | 1.00 | 0.34 | 0.34 | 68 |
| Flumetsulam | 1247 | 35.0% | 1.00 | 0.05 | 0.05 | 59 |
| Flufenacet | 65 | 1.8% | 1.00 | 0.61 | 0.61 | 39 |
| Nicosulfuron | 1152 | 32.3% | 1.00 | 0.01 | 0.01 | 12 |
| Primisulfuron | 540 | 15.1% | 1.00 | 0.02 | 0.02 | 11 |
| Metribuzin | 65 | 1.8% | 1.00 | 0.15 | 0.15 | 10 |
| Rimsulfuron | 883 | 24.8% | 1.00 | 0.01 | 0.01 | 7 |
| Lambda-cyhalothrin | 110 | 3.1% | 1.00 | 0.02 | 0.02 | 2 |
| Tebupirimphos | 120 | 3.4% | 1.00 | 0.01 | 0.01 | 1 |
| Cyfluthrin | 120 | 3.4% | 1.00 | 0.01 | 0.01 | 1 |
| Imazapyr | 90 | 2.5% | 1.00 | 0.01 | 0.01 | <1 |
| Imazethapyr | 90 | 2.5% | 1.00 | 0.01 | 0.01 | <1 |
| Thifensulfuron methyl | 21 | 0.6% | 1.00 | 0.01 | 0.01 | <1 |

**Table 7. Pesticide use by active ingredient for CORN acres –
HASTINGS (2000).**

| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Appli- cations | Mean Rates | | Total Applied Crop Year (lbs) |
|--|---------------|--------------------|-------------------------------------|---------------------------------------|-----------------------------------|---|
| | Corn Acres | Percent Treated | | Rate per Appli- cation (lbs) | Rate per Crop Year (lbs) | |
| Hastings | 6,771 | | | | | |
| Atrazine | 4,600 | 67.9% | 1.15 | 0.63 | 0.72 | 3,298 |
| Metolachlor & s- Metolachlor | 1,229 | 18.2% | 1.00 | 1.70 | 1.70 | 2,084 |
| Terbufos | 1,107 | 16.3% | 1.00 | 1.20 | 1.20 | 1,328 |
| Acetochlor | 1,230 | 18.2% | 1.24 | 0.70 | 0.87 | 1,070 |
| Pendimethalin | 1,200 | 17.7% | 1.00 | 0.88 | 0.88 | 1,062 |
| Glyphosate | 558 | 8.2% | 1.00 | 0.75 | 0.75 | 419 |
| Clopyralid | 2,575 | 38.0% | 1.00 | 0.09 | 0.09 | 227 |
| Cyanazine | 264 | 3.9% | 1.00 | 0.67 | 0.67 | 177 |
| Dicamba | 1,416 | 20.9% | 1.00 | 0.08 | 0.08 | 116 |
| Glufosinate- ammonium | 300 | 4.4% | 1.00 | 0.31 | 0.31 | 94 |
| Flumetsulam | 2,555 | 37.7% | 1.00 | 0.03 | 0.03 | 84 |
| Tefluthrin | 202 | 3.0% | 1.00 | 0.19 | 0.19 | 38 |
| Nicosulfuron | 2,384 | 35.2% | 1.00 | 0.01 | 0.01 | 36 |
| Tebupirimphos | 211 | 3.1% | 1.00 | 0.15 | 0.15 | 31 |
| Imazethapyr | 711 | 10.5% | 1.00 | 0.04 | 0.04 | 30 |
| Rimsulfuron | 1,747 | 25.8% | 1.00 | 0.01 | 0.01 | 22 |
| Primisulfuron | 496 | 7.3% | 1.00 | 0.02 | 0.02 | 12 |
| Imazapyr | 711 | 10.5% | 1.00 | 0.01 | 0.01 | 10 |
| Bromoxynil | 20 | 0.3% | 1.00 | 0.10 | 0.10 | 2 |
| Alachlor | 8 | 0.1% | 1.00 | 0.23 | 0.23 | 2 |
| Cyfluthrin | 211 | 3.1% | 1.00 | 0.01 | 0.01 | 2 |

**Table 9. Pesticide use by active ingredient for CORN acres –
WHITEWATER RIVER (1998).**

| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Appli- cations | Mean Rates | | Total Applied Crop Year (lbs) |
|--|---------------|--------------------|-------------------------------------|---------------------------------------|-----------------------------------|---|
| | Corn Acres | Percent Treated | | Rate per Appli- cation (lbs) | Rate per Crop Year (lbs) | |
| Whitewater River | 3,069 | | | | | |
| Acetochlor | 2185 | 71.2% | 1.00 | 2.35 | 2.35 | 5,128 |
| Atrazine | 1810 | 59.0% | 1.00 | 0.61 | 0.61 | 1,099 |
| Metolachlor & s- Metolachlor | 300 | 9.8% | 1.00 | 2.34 | 2.34 | 701 |
| Dicamba | 2142 | 69.8% | 1.00 | 0.29 | 0.29 | 613 |
| Clopyralid | 204 | 6.6% | 1.00 | 1.08 | 1.08 | 221 |
| Cyanazine | 105 | 3.4% | 1.00 | 1.35 | 1.35 | 142 |
| Alachlor | 81 | 2.6% | 1.00 | 1.67 | 1.67 | 136 |
| Dimethenamid | 85 | 2.8% | 1.00 | 1.05 | 1.05 | 89 |
| Terbufos | 132 | 4.3% | 1.00 | 0.67 | 0.67 | 89 |
| Tebupirimphos | 560 | 18.2% | 1.00 | 0.13 | 0.13 | 73 |
| Tefluthrin | 726 | 23.7% | 1.00 | 0.08 | 0.08 | 59 |
| Bromoxynil | 246 | 8.0% | 1.00 | 0.24 | 0.24 | 58 |
| Carbofuran | 57 | 1.9% | 1.00 | 1.00 | 1.00 | 57 |
| Phorate | 33 | 1.1% | 1.00 | 1.20 | 1.20 | 40 |
| 2,4-D | 111 | 3.6% | 1.00 | 0.20 | 0.20 | 23 |
| Chlorpyrifos | 24 | 0.8% | 1.00 | 0.90 | 0.90 | 22 |
| Nicosulfuron | 483 | 15.7% | 1.00 | 0.02 | 0.02 | 12 |
| Imazethapyr | 247 | 8.0% | 1.00 | 0.04 | 0.04 | 10 |
| Halosulfuron-methyl | 505 | 16.5% | 1.00 | 0.02 | 0.02 | 10 |
| Flumetsulam | 204 | 6.6% | 1.00 | 0.04 | 0.04 | 9 |
| Imazapyr | 247 | 8.0% | 1.00 | 0.01 | 0.01 | 4 |
| Primisulfuron | 217 | 7.1% | 1.00 | 0.02 | 0.02 | 4 |
| Prosulfuron | 217 | 7.1% | 1.00 | 0.02 | 0.02 | 4 |
| Cyfluthrin | 560 | 18.2% | 1.00 | 0.01 | 0.01 | 3 |

Pesticide use by type of pesticide across all surveyed **SOYBEAN** acres is described in Table 10.

| Table 10. Pesticide use by type of pesticide for surveyed SOYBEAN acres. | | | | |
|---|----------------------|--------------------------------|---------------------------------|-------------------------|
| Survey Project And Type of Pesticide | Soybean Acres | Pesticide Applied Acres | Percent of Acres Treated | Total AI Applied |
| St. Peter Wellhead (1996) | 1,836 | | | |
| Herbicide | | 1,836 | 100% | 2,097 |
| Insecticide | | 0 | 00% | 0 |
| Fungicide | | 0 | 00% | 0 |
| Whitewater River (1998) | 1,532 | | | |
| Herbicide | | 1,532 | 100% | 1,330 |
| Insecticide | | 62 | 04% | 4 |
| Fungicide | | 0 | 00% | 0 |
| Hastings (2000) | 4,400 | | | |
| Herbicide | | 4,017 | 91% | 3,631 |
| Insecticide | | 0 | 00% | 0 |
| Fungicide | | 0 | 00% | 0 |
| Cottage Grove (2000) | 3,934 | | | |
| Herbicide | | 3,805 | 97% | 3,263 |
| Insecticide | | 0 | 00% | 0 |
| Fungicide | | 0 | 00% | 0 |
| Combined Project Data | 11,702 | | | |
| Herbicide | | 11,190 | 96% | 10,321 |
| Insecticide | | 62 | 1% | 4 |
| Fungicide | | 0 | 00% | 0 |

Tables 11 through 14 describe pesticide use by active ingredient on surveyed **SOYBEAN** acres in the four survey projects.

| Table 11. Pesticide use by active ingredient for SOYBEAN acres – ST. PETER WELLHEAD (1996). | | | | | | |
|--|----------------------|------------------------|---------------------------------|-----------------------------|---------------------------|--------------------------------|
| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Average Rates | | Total Applied Crop Year |
| | Soybean Acres | Percent Treated | | Rate per Application | Rate per Crop Year | |
| St. Peter | 1,836 | | | | | |
| Trifluralin | 1,060 | 57.7% | 1.00 | 0.76 | 0.76 | 810 |
| Bentazon | 523 | 28.5% | 1.00 | 0.73 | 0.73 | 383 |
| Clomazone | 301 | 16.4% | 1.00 | 0.94 | 0.94 | 284 |
| Pendimethalin | 163 | 8.9% | 1.00 | 1.24 | 1.24 | 202 |
| Ethalfluralin | 246 | 13.4% | 1.00 | 0.68 | 0.68 | 166 |
| Alachlor | 42 | 2.3% | 1.00 | 2.67 | 2.67 | 112 |
| Acifluorfen | 362 | 19.7% | 1.00 | 0.16 | 0.16 | 57 |
| Imazethapyr | 1,022 | 55.7% | 1.00 | 0.05 | 0.05 | 54 |
| Sethoxydim | 96 | 5.2% | 1.00 | 0.14 | 0.14 | 13 |
| Fomesafen | 34 | 1.9% | 1.00 | 0.25 | 0.25 | 9 |
| Lactofen | 35 | 1.9% | 1.00 | 0.12 | 0.12 | 4 |
| Flumetsulam | 37 | 2.0% | 1.00 | 0.03 | 0.03 | 1 |
| 2,4-D | 32 | 1.7% | 1.00 | 0.02 | 0.02 | 1 |
| Thifensulfuron | 47 | 2.6% | 1.00 | <0.01 | <0.01 | <1 |

Table 12. Pesticide use by active ingredient for SOYBEAN acres – WHITEWATER RIVER (1998).

| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Appli- cations | Mean Rates | | Total Applied Crop Year (lbs) |
|--|------------------|--------------------|-------------------------------------|---------------------------------------|-----------------------------------|---|
| | Soybean Acres | Percent Treated | | Rate per Appli- cation (lbs) | Rate per Crop Year (lbs) | |
| Whitewater River | 1,532 | | | | | |
| Pendimethalin | 287 | 18.7% | 1.00 | 1.20 | 1.20 | 343 |
| Bentazon | 263 | 17.2% | 1.00 | 0.75 | 0.75 | 197 |
| Clomazone | 255 | 16.6% | 1.00 | 0.76 | 0.76 | 195 |
| Acetochlor | 62 | 4.0% | 1.00 | 2.41 | 2.41 | 149 |
| Sethoxydim | 545 | 35.6% | 1.00 | 0.25 | 0.25 | 136 |
| Glyphosate | 80 | 5.2% | 1.00 | 1.00 | 1.00 | 80 |
| Fomesafen | 182 | 11.9% | 1.00 | 0.38 | 0.38 | 70 |
| Imazethapyr | 1,135 | 74.1% | 1.00 | 0.06 | 0.06 | 63 |
| Acifluorfen | 146 | 9.5% | 1.00 | 0.17 | 0.17 | 24 |
| Clethodim | 292 | 19.1% | 1.00 | 0.08 | 0.08 | 24 |
| Fluazifop-p-butyl | 123 | 8.0% | 1.00 | 0.16 | 0.16 | 19 |
| Trifluralin | 21 | 1.4% | 1.00 | 0.75 | 0.75 | 16 |
| Fenoxaprop-p-ethyl | 123 | 8.0% | 1.00 | 0.04 | 0.04 | 5 |
| Tefluthrin | 62 | 4.0% | 1.00 | 0.07 | 0.07 | 4 |
| Dicamba | 62 | 4.0% | 1.00 | 0.03 | 0.03 | 2 |
| Metribuzin | 15 | 1.0% | 1.00 | 0.13 | 0.13 | 2 |
| Flumiclorac pentyl | 64 | 4.2% | 1.00 | 0.03 | 0.03 | 2 |
| Thifensulfuron | 529 | 34.5% | 1.00 | <0.01 | <0.01 | 1 |
| Halosulfuron-methyl | 62 | 4.0% | 1.00 | 0.02 | 0.02 | 1 |

**Table 13. Pesticide use by active ingredient for SOYBEAN acres –
HASTINGS (2000).**

| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Appli- cations | Mean Rates | | Total Applied Crop Year (lbs) |
|--|------------------|--------------------|-------------------------------------|---------------------------------------|-----------------------------------|---|
| | Soybean Acres | Percent Treated | | Rate per Appli- cation (lbs) | Rate per Crop Year (lbs) | |
| Hastings | 4,400 | | | | | |
| Glyphosate | 2,677 | 60.8% | 1.25 | 0.71 | 0.89 | 2,379 |
| Bentazon | 370 | 8.4% | 1.00 | 1.00 | 1.00 | 370 |
| Metolachlor & s- Metolachlor | 183 | 4.2% | 1.00 | 1.87 | 1.87 | 342 |
| Pendimethalin | 261 | 5.9% | 1.00 | 0.73 | 0.73 | 189 |
| 2,4-D | 300 | 6.8% | 1.00 | 0.47 | 0.47 | 140 |
| Sethoxydim | 370 | 8.4% | 1.25 | 0.21 | 0.26 | 97 |
| Metribuzin | 160 | 3.6% | 1.00 | 0.23 | 0.23 | 38 |
| Imazamox | 1,034 | 23.5% | 1.00 | 0.03 | 0.03 | 33 |
| Imazethapyr | 336 | 7.6% | 1.00 | 0.05 | 0.05 | 16 |
| Flumetsulam | 183 | 4.2% | 1.00 | 0.05 | 0.05 | 9 |
| Fluazifop-p-butyl | 45 | 1.0% | 1.00 | 0.13 | 0.13 | 6 |
| Fomesafen | 250 | 5.7% | 1.00 | 0.02 | 0.02 | 5 |
| Trifluralin | 13 | 0.3% | 1.00 | 0.38 | 0.38 | 5 |
| Cloransulam-methyl | 155 | 3.5% | 1.00 | 0.01 | 0.01 | 2 |
| Fenoxaprop-p-ethyl | 45 | 1.0% | 1.00 | 0.04 | 0.04 | 2 |
| Flumiclorac pentyl | 6 | 0.1% | 1.00 | 0.03 | 0.03 | <1 |

| Table 14. Pesticide use by active ingredient for SOYBEAN acres – COTTAGE GROVE (2000). | | | | | | |
|---|----------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| Cottage Grove | 3,934 | | | | | |
| Glyphosate | 2,430 | 61.8% | 1.07 | 0.72 | 0.77 | 1,874 |
| Pendimethalin | 776 | 19.7% | 1.00 | 0.78 | 0.78 | 608 |
| Bentazon | 710 | 18.0% | 1.00 | 0.51 | 0.51 | 361 |
| Imazethapyr | 1,429 | 36.3% | 1.00 | 0.22 | 0.22 | 312 |
| Sethoxydim | 660 | 16.8% | 1.00 | 0.09 | 0.09 | 62 |
| Fomesafen | 115 | 2.9% | 1.00 | 0.21 | 0.21 | 24 |
| Quizalofop p ethyl | 220 | 5.6% | 1.00 | 0.05 | 0.05 | 12 |
| Fluazifop-p-butyl | 113 | 2.9% | 1.00 | 0.03 | 0.03 | 4 |
| Fenoxaprop-p-ethyl | 113 | 2.9% | 1.00 | 0.03 | 0.03 | 4 |
| Imazamox | 100 | 2.5% | 1.00 | 0.03 | 0.03 | 3 |
| Cloransulam-methyl | 112 | 2.8% | 1.00 | <0.01 | <0.01 | <1 |
| Thifensulfuron methyl | 80 | 2.0% | 1.00 | <0.01 | <0.01 | <1 |

Only the Hastings survey project identified additional crops with more than 500 planted acres per crop. Pesticide use on seed corn, potatoes and peas in the Hastings area is analyzed in tables 15 through 17.

| Table 15. Pesticide use by active ingredient for SEED CORN acres – HASTINGS (2000). | | | | | | |
|--|------------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Seed Corn Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| Hastings | 1,126 | | | | | |
| Metolachlor & s-Metolachlor | 528 | 46.9% | 1.00 | 1.34 | 1.34 | 708 |
| Atrazine | 518 | 46.0% | 2.00 | 0.60 | 1.20 | 620 |
| Acetochlor | 438 | 38.9% | 1.67 | 0.49 | 0.82 | 360 |
| Glyphosate | 433 | 38.5% | 1.00 | 0.75 | 0.75 | 325 |
| Pendimethalin | 300 | 26.6% | 1.00 | 0.93 | 0.93 | 278 |
| Clopyralid | 772 | 68.6% | 1.00 | 0.08 | 0.08 | 62 |
| Cyanazine | 124 | 11.0% | 1.00 | 0.41 | 0.41 | 51 |
| Flumetsulam | 772 | 68.6% | 1.00 | 0.03 | 0.03 | 23 |
| Nicosulfuron | 344 | 30.6% | 1.00 | 0.02 | 0.02 | 8 |

| Table 16. Pesticide use by active ingredient for POTATO acres – HASTINGS (2000). | | | | | | |
|---|----------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Potato Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| Hastings | 1,150 | | | | | |
| Chlorothalonil | 1,150 | 100.0% | 14.00 | 0.89 | 12.41 | 14,267 |
| Phorate | 1,150 | 100.0% | 1.00 | 2.20 | 2.20 | 2,530 |
| Metribuzin | 1,150 | 100.0% | 1.00 | 0.45 | 0.45 | 518 |
| Thiophanate-methyl | 600 | 52.2% | 1.00 | 0.70 | 0.70 | 420 |
| Pendimethalin | 600 | 52.2% | 1.00 | 0.62 | 0.62 | 371 |
| Diquat | 1,150 | 100.0% | 1.00 | 0.25 | 0.25 | 288 |
| Azoxystrobin | 1,150 | 100.0% | 2.00 | 0.10 | 0.20 | 232 |
| Metalaxyl | 1,150 | 100.0% | 1.00 | 0.15 | 0.15 | 173 |
| Sethoxydim | 600 | 52.2% | 1.00 | 0.19 | 0.19 | 113 |
| Fludioxonil | 550 | 47.8% | 1.00 | 0.04 | 0.04 | 19 |

| Table 17. Pesticide use by active ingredient for PEA acres – HASTINGS (2000). | | | | | | |
|--|----------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Survey Project and Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Pea Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| Hastings | 938 | | | | | |
| Pendimethalin | 938 | 100.0% | 1 | .77 | .77 | 722 |

Tables 18 through 26 provide summaries of pesticide use by AI by combining surveyed acres for crops identified in all four survey projects.

| Table 18. Pesticide use by active ingredient for CORN acres – ALL SURVEY PROJECTS. | | | | | | |
|---|----------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Corn Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| All Survey Projects | 15,734 | | | | | |
| Acetochlor | 5,912 | 37.6% | 1.04 | 1.60 | 1.66 | 9,827 |
| Atrazine | 9,440 | 60.0% | 1.09 | 0.69 | 0.75 | 7,106 |
| Metolachlor & s-Metolachlor | 3,004 | 19.1% | 1.00 | 2.03 | 2.03 | 6,093 |
| EPTC | 829 | 5.3% | 1.00 | 4.08 | 4.08 | 3,382 |
| Pendimethalin | 1,904 | 12.1% | 1.00 | 0.92 | 0.92 | 1,745 |
| Terbufos | 1,239 | 7.9% | 1.00 | 1.14 | 1.14 | 1,417 |
| Dicamba | 5,596 | 35.6% | 1.00 | 0.25 | 0.25 | 1,417 |
| Clopyralid | 4,572 | 29.1% | 1.00 | 0.13 | 0.13 | 576 |
| Cyanazine | 666 | 4.2% | 1.00 | 0.81 | 0.81 | 536 |
| Glyphosate | 558 | 3.5% | 1.00 | 0.75 | 0.75 | 419 |
| Glufosinate-ammonium | 750 | 4.8% | 1.00 | 0.33 | 0.33 | 247 |
| 2,4-D | 1,131 | 7.2% | 1.00 | 0.20 | 0.20 | 222 |
| Flumetsulam | 4,659 | 29.6% | 1.00 | 0.04 | 0.04 | 202 |
| Alachlor | 89 | 0.6% | 1.00 | 1.54 | 1.54 | 137 |
| Bromoxynil | 466 | 3.0% | 1.00 | 0.27 | 0.27 | 127 |
| Chlorpyrifos | 99 | 0.6% | 1.00 | 1.13 | 1.13 | 112 |
| Tebupirimphos | 891 | 5.7% | 1.00 | 0.12 | 0.12 | 105 |
| Tefluthrin | 928 | 5.9% | 1.00 | 0.11 | 0.11 | 98 |
| Dimethenamid | 85 | 0.5% | 1.00 | 1.05 | 1.05 | 89 |
| Nicosulfuron | 4,267 | 27.1% | 1.00 | 0.02 | 0.02 | 65 |
| Carbofuran | 57 | 0.4% | 1.00 | 1.00 | 1.00 | 57 |
| Imazethapyr | 1,048 | 6.7% | 1.00 | 0.04 | 0.04 | 41 |
| Phorate | 33 | 0.2% | 1.00 | 1.20 | 1.20 | 40 |
| Flufenacet | 65 | 0.4% | 1.00 | 0.61 | 0.61 | 39 |
| Rimsulfuron | 2,630 | 16.7% | 1.00 | 0.01 | 0.01 | 30 |
| Primisulfuron | 1,283 | 8.2% | 1.00 | 0.02 | 0.02 | 27 |
| Imazapyr | 1,048 | 6.7% | 1.00 | 0.01 | 0.01 | 14 |
| Halosulfuron-methyl | 505 | 3.2% | 1.00 | 0.02 | 0.02 | 10 |
| Metribuzin | 65 | 0.4% | 1.00 | 0.15 | 0.15 | 10 |
| Permethrin | 52 | 0.3% | 1.00 | 0.14 | 0.14 | 7 |
| Cyfluthrin | 891 | 5.7% | 1.00 | 0.01 | 0.01 | 6 |
| Prosulfuron | 247 | 1.6% | 1.00 | 0.02 | 0.02 | 4 |
| Lambda-cyhalothrin | 276 | 1.8% | 1.00 | 0.01 | 0.01 | 3 |
| Thifensulfuron methyl | 21 | 0.1% | 1.00 | 0.01 | 0.01 | <1 |

Table 19. Pesticide use by active ingredient for SOYBEAN acres – ALL SURVEY PROJECTS.

| Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
|-----------------------------|---------------|-----------------|--------------------------|----------------------------|--------------------------|-------------------------------|
| | Soybean Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| All Survey Projects | 11,702 | | | | | |
| Glyphosate | 5,187 | 44.3% | 1.14 | 0.73 | 0.84 | 4,332 |
| Pendimethalin | 1,487 | 12.7% | 1.00 | 0.90 | 0.90 | 1,343 |
| Bentazon | 1,866 | 15.9% | 1.00 | 0.70 | 0.70 | 1,312 |
| Trifluralin | 1,094 | 9.3% | 1.00 | 0.76 | 0.76 | 831 |
| Clomazone | 556 | 4.8% | 1.00 | 0.86 | 0.86 | 479 |
| Imazethapyr | 3,922 | 33.5% | 1.00 | 0.11 | 0.11 | 445 |
| Metolachlor & s-Metolachlor | 183 | 1.6% | 1.00 | 1.87 | 1.87 | 342 |
| Sethoxydim | 1,671 | 14.3% | 1.04 | 0.18 | 0.18 | 307 |
| Ethalfuralin | 246 | 2.1% | 1.00 | 0.68 | 0.68 | 166 |
| Acetochlor | 62 | 0.5% | 1.00 | 2.41 | 2.41 | 149 |
| 2,4-D | 332 | 2.8% | 1.00 | 0.42 | 0.42 | 141 |
| Alachlor | 42 | 0.4% | 1.00 | 2.67 | 2.67 | 112 |
| Fomesafen | 581 | 5.0% | 1.00 | 0.19 | 0.19 | 108 |
| Acifluorfen | 508 | 4.3% | 1.00 | 0.16 | 0.16 | 81 |
| Metribuzin | 175 | 1.5% | 1.00 | 0.23 | 0.23 | 39 |
| Imazamox | 1,134 | 9.7% | 1.00 | 0.03 | 0.03 | 36 |
| Fluazifop-p-butyl | 281 | 2.4% | 1.00 | 0.10 | 0.10 | 29 |
| Clethodim | 292 | 2.5% | 1.00 | 0.08 | 0.08 | 24 |
| Quizalofop p ethyl | 220 | 1.9% | 1.00 | 0.05 | 0.05 | 12 |
| Fenoxaprop-p-ethyl | 281 | 2.4% | 1.00 | 0.04 | 0.04 | 11 |
| Flumetsulam | 220 | 1.9% | 1.00 | 0.05 | 0.05 | 10 |
| Lactofen | 35 | 0.3% | 1.00 | 0.12 | 0.12 | 4 |
| Tefluthrin | 62 | 0.5% | 1.00 | 0.07 | 0.07 | 4 |
| Cloransulam-methyl | 267 | 2.3% | 1.00 | 0.01 | 0.01 | 2 |
| Dicamba | 62 | 0.5% | 1.00 | 0.03 | 0.03 | 2 |
| Flumiclorac pentyl | 70 | 0.6% | 1.00 | 0.03 | 0.03 | 2 |
| Thifensulfuron | 576 | 4.9% | 1.00 | 0.00 | 0.00 | 1 |
| Halosulfuron-methyl | 62 | 0.5% | 1.00 | 0.02 | 0.02 | 1 |
| Thifensulfuron methyl | 80 | 0.7% | 1.00 | 0.00 | 0.00 | <1 |

Table 20 is a duplicate of Table 16 since all potato acres surveyed were part of the Hasting survey project.

| Table 20. Pesticide use by active ingredient for POTATO acres – ALL SURVEY PROJECTS. | | | | | | |
|---|----------------------|------------------------|---------------------------------|-----------------------------|---------------------------|--------------------------------|
| Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Average Rates | | Total Applied Crop Year |
| | Potato Acres | Percent Treated | | Rate per Application | Rate per Crop Year | |
| All Survey Projects | 1,150 | | | | | |
| Chlorothalonil | 1,150 | 100.0% | 14.00 | 0.89 | 12.41 | 14,267 |
| Phorate | 1,150 | 100.0% | 1.00 | 2.20 | 2.20 | 2,530 |
| Metribuzin | 1,150 | 100.0% | 1.00 | 0.45 | 0.45 | 518 |
| Thiophanate-methyl | 600 | 52.2% | 1.00 | 0.70 | 0.70 | 420 |
| Pendimethalin | 600 | 52.2% | 1.00 | 0.62 | 0.62 | 371 |
| Diquat | 1,150 | 100.0% | 1.00 | 0.25 | 0.25 | 288 |
| Azoxystrobin | 1,150 | 100.0% | 2.00 | 0.10 | 0.20 | 232 |
| Metalaxyl | 1,150 | 100.0% | 1.00 | 0.15 | 0.15 | 173 |
| Sethoxydim | 600 | 52.2% | 1.00 | 0.19 | 0.19 | 113 |
| Fludioxonil | 550 | 47.8% | 1.00 | 0.04 | 0.04 | 19 |

| Table 21. Pesticide use by active ingredient for SWEET CORN acres – ALL SURVEY PROJECTS | | | | | | |
|--|-------------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Sweet Corn Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| All Survey Projects | 1,276 | | | | | |
| Metolachlor & s-Metolachlor | 780 | 61.1% | 1.00 | 2.08 | 2.08 | 1,622 |
| EPTC | 336 | 26.3% | 1.00 | 4.03 | 4.03 | 1,353 |
| Atrazine | 730 | 57.2% | 1.30 | 0.70 | 0.91 | 666 |
| Terbufos | 278 | 21.8% | 1.00 | 1.12 | 1.12 | 310 |
| Alachlor | 60 | 4.7% | 1.00 | 3.00 | 3.00 | 180 |
| Bentazon | 500 | 39.2% | 1.00 | 0.24 | 0.24 | 119 |
| 2,4-D | 118 | 9.2% | 1.00 | 0.47 | 0.47 | 55 |
| Dimethenamid | 30 | 2.4% | 1.00 | 1.50 | 1.50 | 45 |
| Chlorpyrifos | 33 | 2.6% | 1.00 | 1.05 | 1.05 | 35 |
| Lambda-cyhalothrin | 400 | 31.3% | 1.00 | 0.03 | 0.03 | 10 |
| Tebupirimphos | 63 | 4.9% | 1.00 | 0.12 | 0.12 | 8 |
| Nicosulfuron | 30 | 2.4% | 1.00 | 0.03 | 0.03 | 1 |
| Cyfluthrin | 63 | 4.9% | 1.00 | 0.01 | 0.01 | <1 |

Table 22 is a duplicate of Table 15 since all seed corn acres surveyed were part of the Hastings survey project area.

| Table 22. Pesticide use by active ingredient for SEED CORN acres – ALL SURVEY PROJECTS. | | | | | | |
|--|------------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Seed Corn Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| All Survey Projects | 1,126 | | | | | |
| Metolachlor & s-Metolachlor | 528 | 46.9% | 1.00 | 1.34 | 1.34 | 708 |
| Atrazine | 518 | 46.0% | 2.00 | 0.60 | 1.20 | 620 |
| Acetochlor | 438 | 38.9% | 1.67 | 0.49 | 0.82 | 360 |
| Glyphosate | 433 | 38.5% | 1.00 | 0.75 | 0.75 | 325 |
| Pendimethalin | 300 | 26.6% | 1.00 | 0.93 | 0.93 | 278 |
| Clopyralid | 772 | 68.6% | 1.00 | 0.08 | 0.08 | 62 |
| Cyanazine | 124 | 11.0% | 1.00 | 0.41 | 0.41 | 51 |
| Flumetsulam | 772 | 68.6% | 1.00 | 0.03 | 0.03 | 23 |
| Nicosulfuron | 344 | 30.6% | 1.00 | 0.02 | 0.02 | 8 |

| Table 23. Pesticide use by active ingredient for PEA acres – ALL SURVEY PROJECTS. | | | | | | |
|--|----------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Pea Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| All Survey Projects | 1,088 | | | | | |
| Pendimethalin | 1,058 | 97.2% | 1.00 | 0.76 | 0.76 | 806 |
| Trifluralin | 30 | 2.8% | 1.00 | 0.50 | 0.50 | 15 |
| Fluazifop-p-butyl | 35 | 3.2% | 1.00 | 0.13 | 0.13 | 5 |
| Flumiclorac pentyl | 35 | 3.2% | 1.00 | 0.05 | 0.05 | 2 |

| Table 24. Pesticide use by active ingredient for ALFALFA acres – ALL SURVEY PROJECTS. | | | | | | |
|--|----------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Alfalfa Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| All Survey Projects | 672 | | | | | |
| Dimethoate | 75 | 12.6% | 2.00 | 0.38 | 0.75 | 56 |
| Malathion | 35 | 5.9% | 1.00 | 1.12 | 1.12 | 39 |
| Metribuzin | 78 | 13.1% | 1.00 | 0.25 | 0.25 | 19 |
| Permethrin | 106 | 17.8% | 1.00 | 0.14 | 0.14 | 15 |
| Cyfluthrin | 300 | 50.5% | 1.50 | 0.03 | 0.04 | 11 |
| Lambda-cyhalothrin | 78 | 13.1% | 1.00 | 0.02 | 0.02 | 2 |

Table 25 details pesticide use by AI across all surveyed **vegetable** acres. Vegetable acres include all vegetable and “fruit” acres such as tomatoes, peppers, eggplant, strawberries, pumpkins and squash. Vegetable acres do not include corn, peas or potatoes.

| Table 25. Pesticide use by active ingredient for VEGETABLE acres – ALL SURVEY PROJECTS. | | | | | | |
|--|------------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Vegetable Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| All Survey Projects | 135 | | | | | |
| Copper | 85 | 63.0% | 1.33 | 2.67 | 3.57 | 303 |
| Metalaxyl | 95 | 70.4% | 1.00 | 0.50 | 0.50 | 48 |
| DCPA | 5 | 3.7% | 1.00 | 9.00 | 9.00 | 45 |
| Trifluralin | 55 | 40.7% | 1.00 | 0.50 | 0.50 | 28 |
| Captan | 5 | 3.7% | 2.00 | 2.45 | 4.89 | 24 |
| Acephate | 55 | 40.7% | 1.00 | 0.38 | 0.38 | 21 |
| Carbaryl | 5 | 3.7% | 1.00 | 2.00 | 2.00 | 10 |
| Endosulfan | 5 | 3.7% | 1.00 | 1.50 | 1.50 | 8 |
| Thiophanate-methyl | 5 | 3.7% | 2.00 | 0.70 | 1.40 | 7 |
| Esfenvalerate | 125 | 92.6% | 1.00 | 0.03 | 0.03 | 4 |
| Benomyl | 5 | 3.7% | 2.00 | 0.38 | 0.75 | 4 |
| Simazine | 1 | 0.7% | 1.00 | 2.00 | 2.00 | 2 |
| Lambda-cyhalothrin | 55 | 40.7% | 1.00 | 0.03 | 0.03 | 1 |
| Imidacloprid | 4 | 3.0% | 1.00 | 0.25 | 0.25 | 1 |

Table 26 details pesticide use by AI across all surveyed **other** acres. Other pesticide applied acres include 91 acres of wheat, 32 acres of oats and 4 acres of pasture.

| Table 26. Pesticide use by active ingredient for OTHER acres – ALL SURVEY PROJECTS. | | | | | | |
|--|----------------------|------------------------|---------------------------------|-----------------------------------|---------------------------------|--------------------------------------|
| Type of Pesticide | Planted Acres | | Mean Number Applications | Mean Rates | | Total Applied Crop Year (lbs) |
| | Other Acres | Percent Treated | | Rate per Application (lbs) | Rate per Crop Year (lbs) | |
| All Survey Projects | 4,370 | | | | | |
| 2,4-D | 115 | 2.6% | 1.00 | 0.47 | 0.47 | 54 |
| Trifluralin | 53 | 1.2% | 1.00 | 0.75 | 0.75 | 40 |
| Glyphosate | 53 | 1.2% | 1.00 | 0.56 | 0.56 | 30 |
| Dimethylamine | 4 | 0.1% | 1.00 | 0.22 | 0.22 | 1 |
| Dicamba | 12 | 0.3% | 1.00 | 0.06 | 0.06 | 1 |
| Diethanolamin | 4 | 0.1% | 1.00 | 0.13 | 0.13 | 1 |

Several pesticides used by surveyed farmers are currently being monitored by the Minnesota Department of Agriculture. These include atrazine, acetochlor, dicamba, metolachlor, 2,4-D, metribuzin, alachlor and dimethenamid. Atrazine, acetolchlor, dicamba and metolachlor applications were analyzed by county. Applications of 2,4-D were limited and were analyzed by state only. The limited number of applications of metribuzin, alachlor and dimethenamid did not allow the development of graphs.

Figures 3 through 7 show the range of atrazine applied per acre by survey project and for all survey projects.

Figures 8 through 12 show the range of acetochlor applied per acre by survey project and for all survey projects.

Figures 13 through 17 show the range of dicamba applied per acre by survey project and for all survey projects.

Figures 18 through 22 show the range of metolachlor applied per acre by survey project and for all survey projects.

Figure 23 shows the range of 2,4-D applied per acre for all survey projects.

Figure 3. Range of atrazine applications on corn acres in St. Peter Wellhead survey project by field.

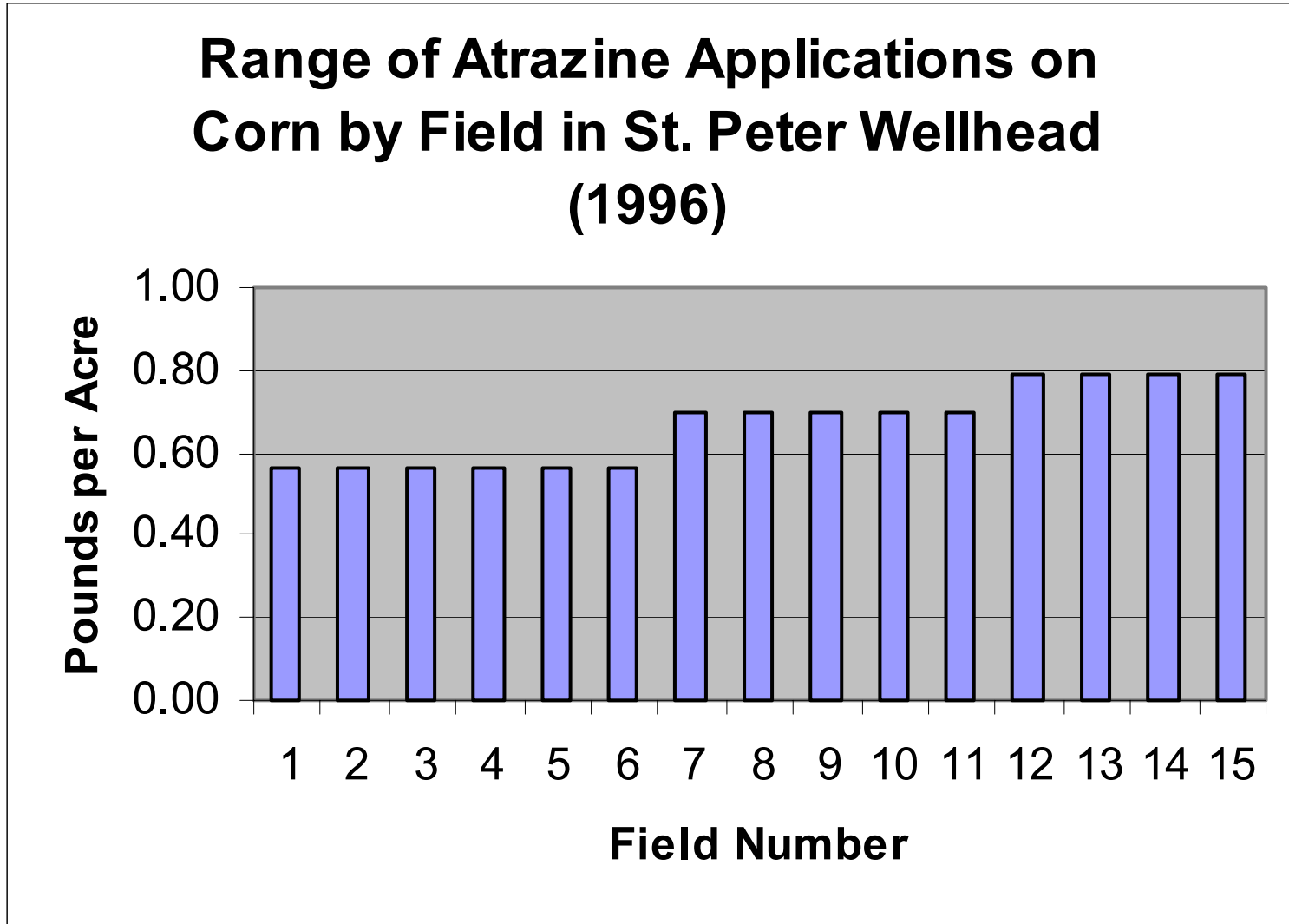


Figure 4. Range of atrazine applications on corn acres in Whitewater River survey project by field.

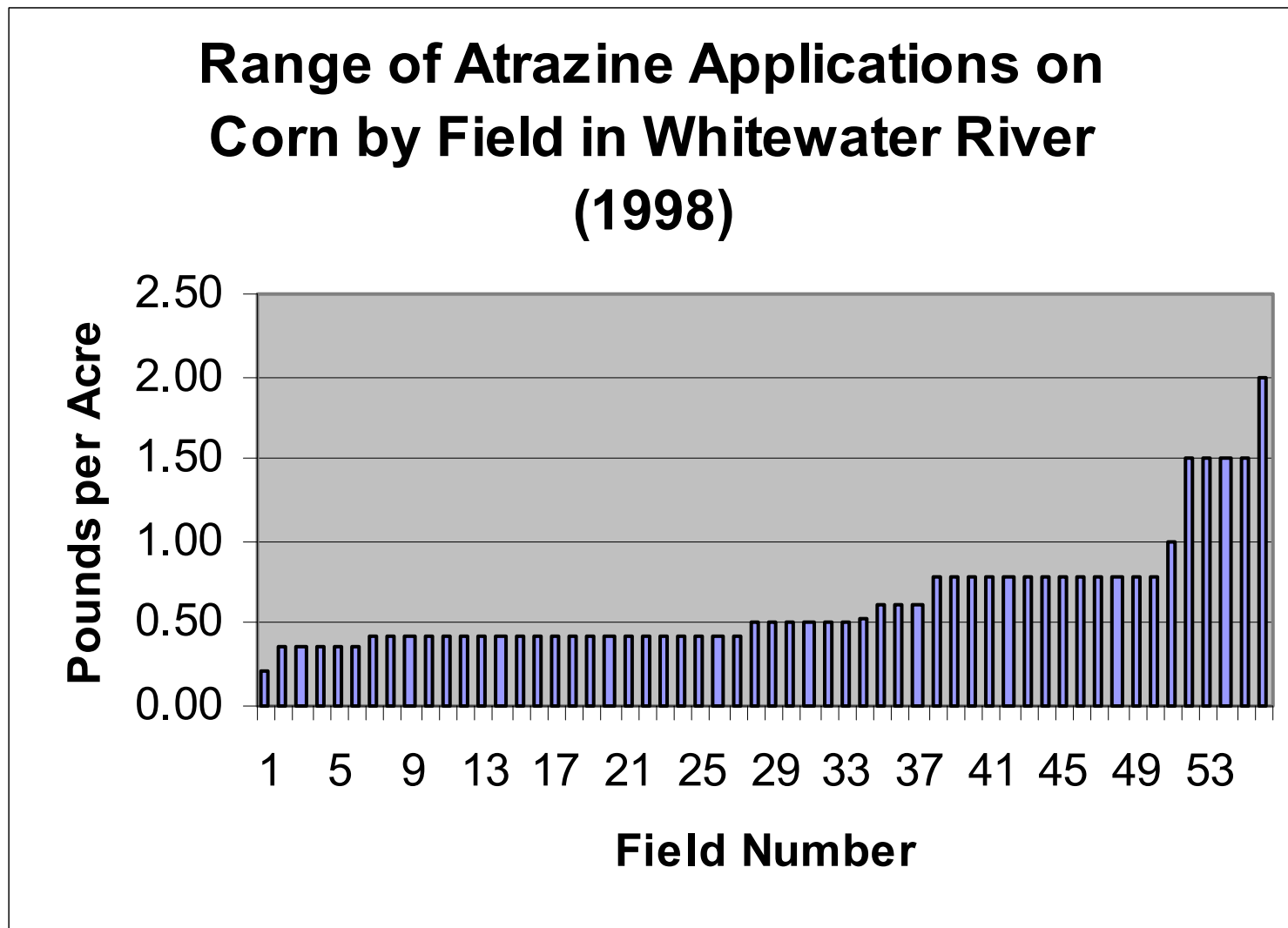


Figure 5. Range of atrazine applications on corn acres in Hastings Area survey project by field.

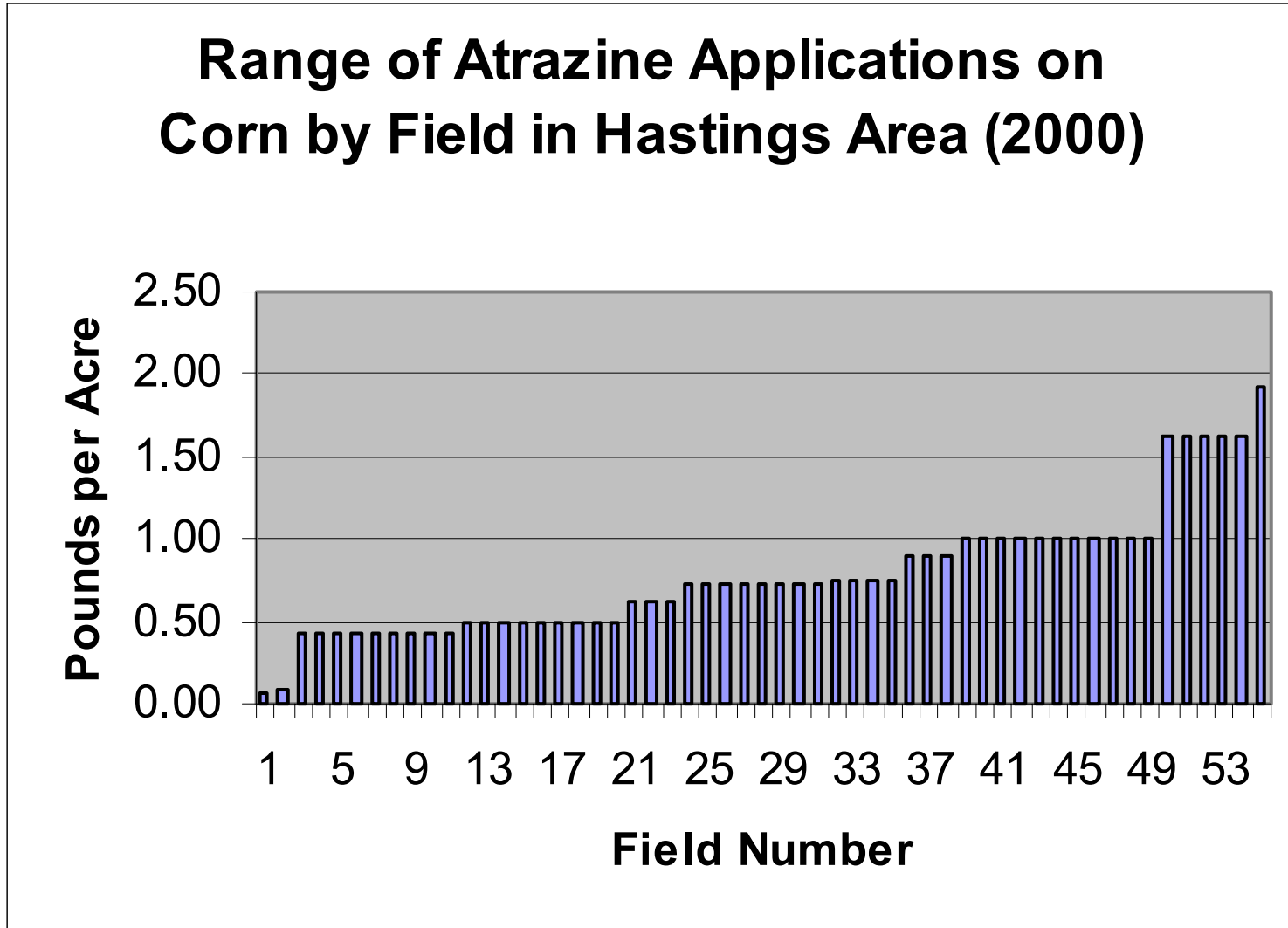


Figure 6. Range of atrazine applications on corn acres in Cottage Grove survey project by field.

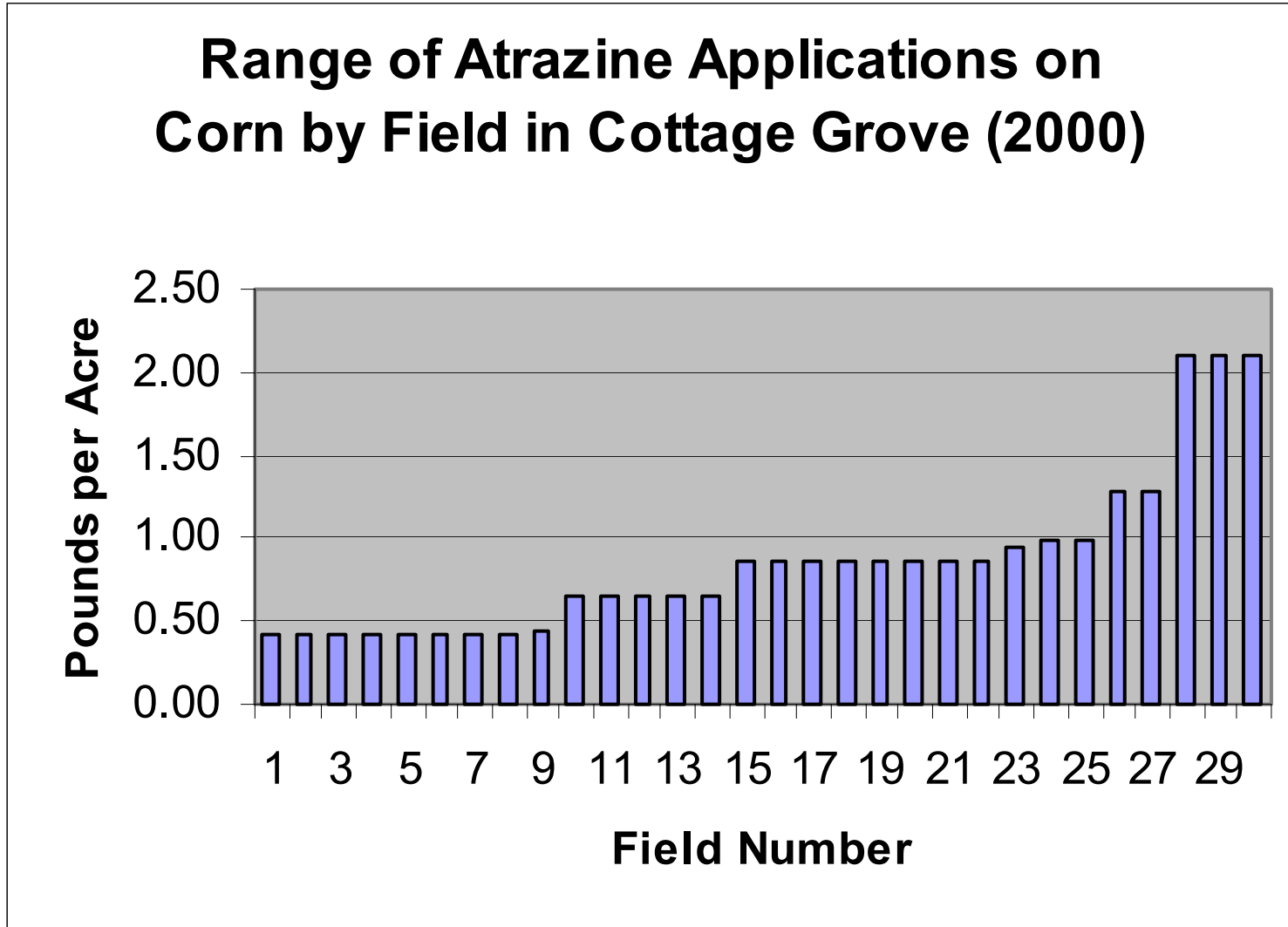


Figure 7. Range of atrazine applications on corn acres for all survey projects by field.

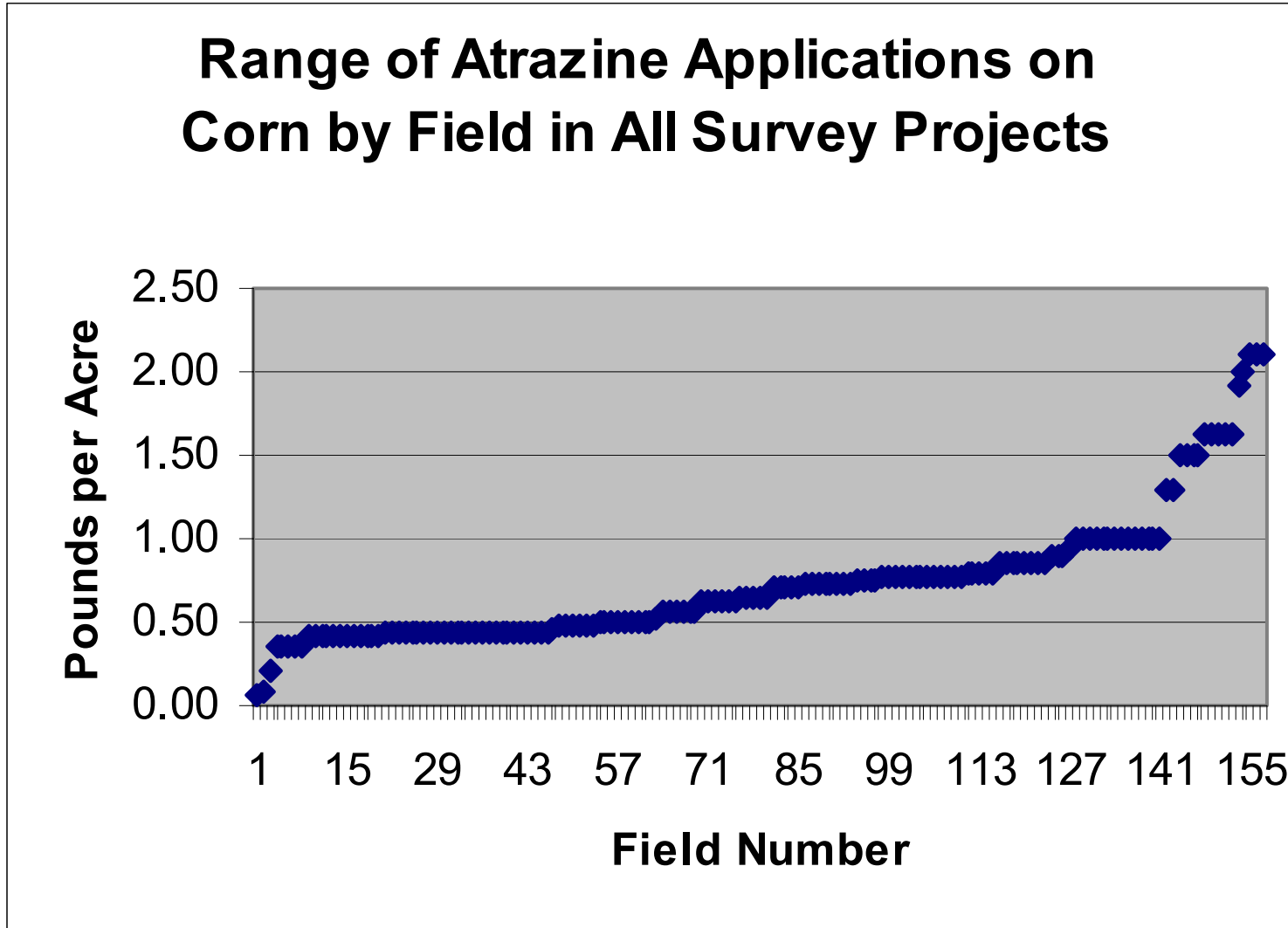


Figure 8. Range of acetochlor applications on corn acres in St. Peter Wellhead survey project by field.

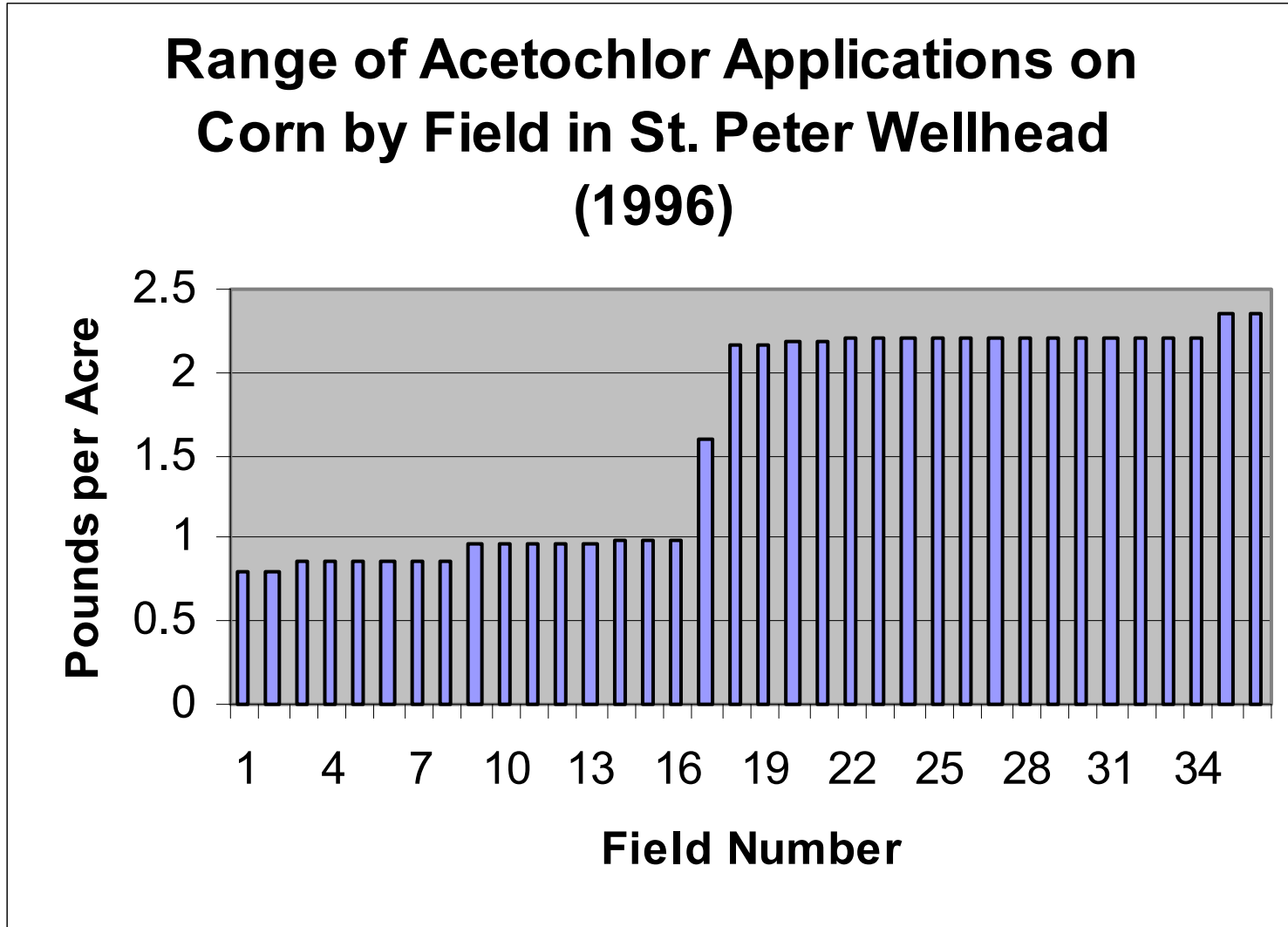


Figure 9. Range of acetochlor applications on corn acres in Whitewater River survey project by field.

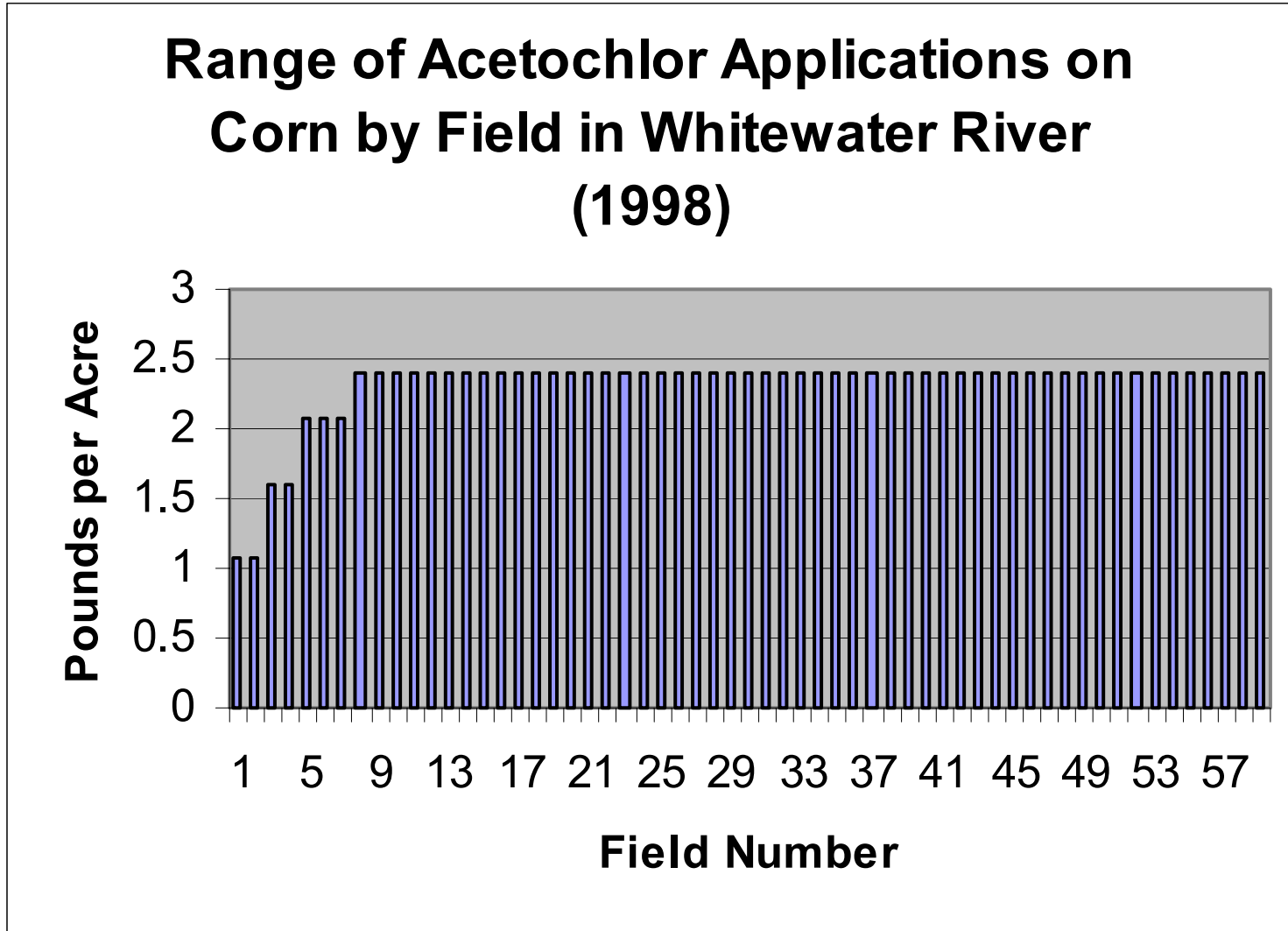


Figure 10. Range of acetochlor applications on corn acres in Hastings Area survey project by field.

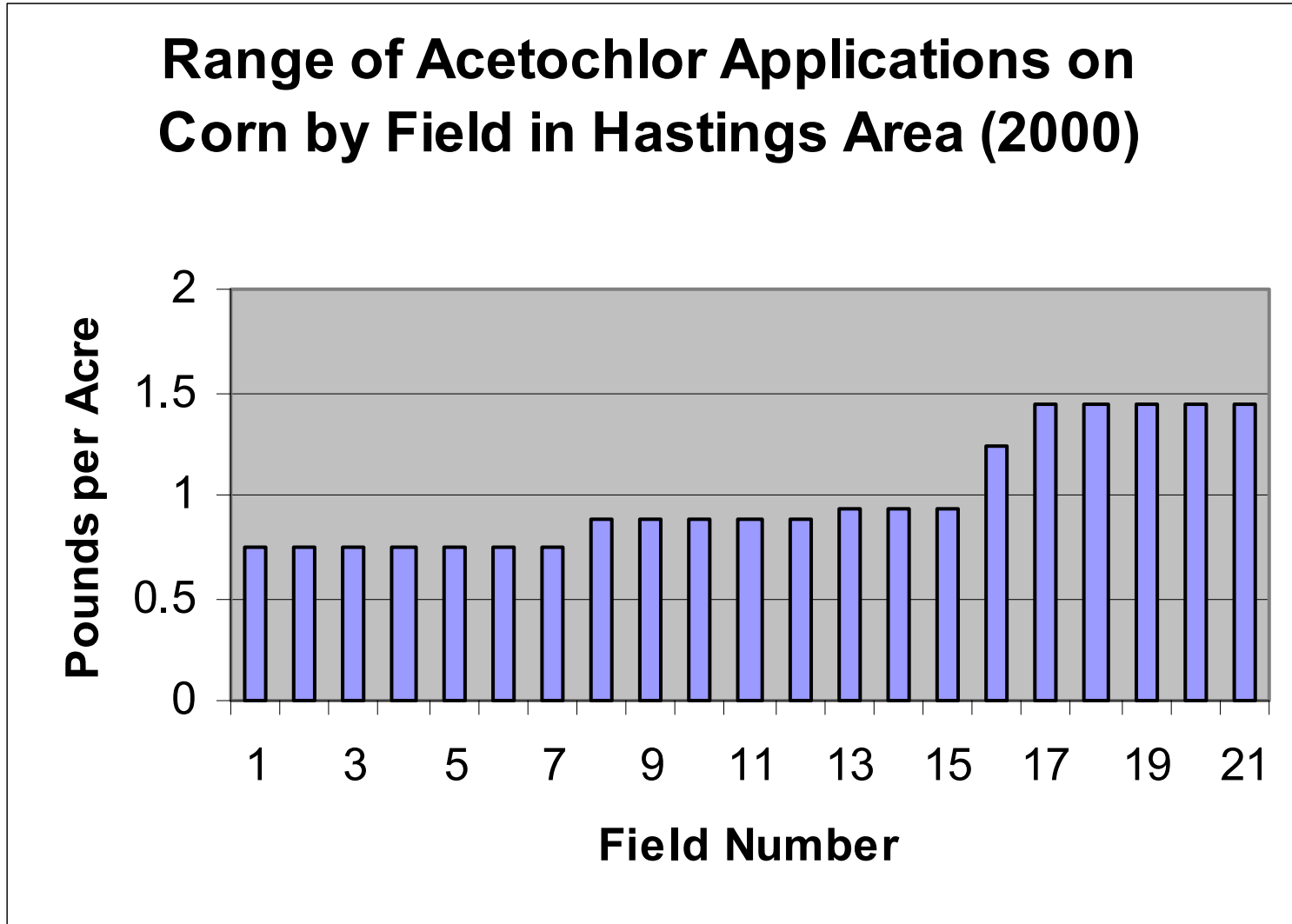


Figure 11. Range of acetochlor applications on corn acres in Cottage Grove survey project by field.

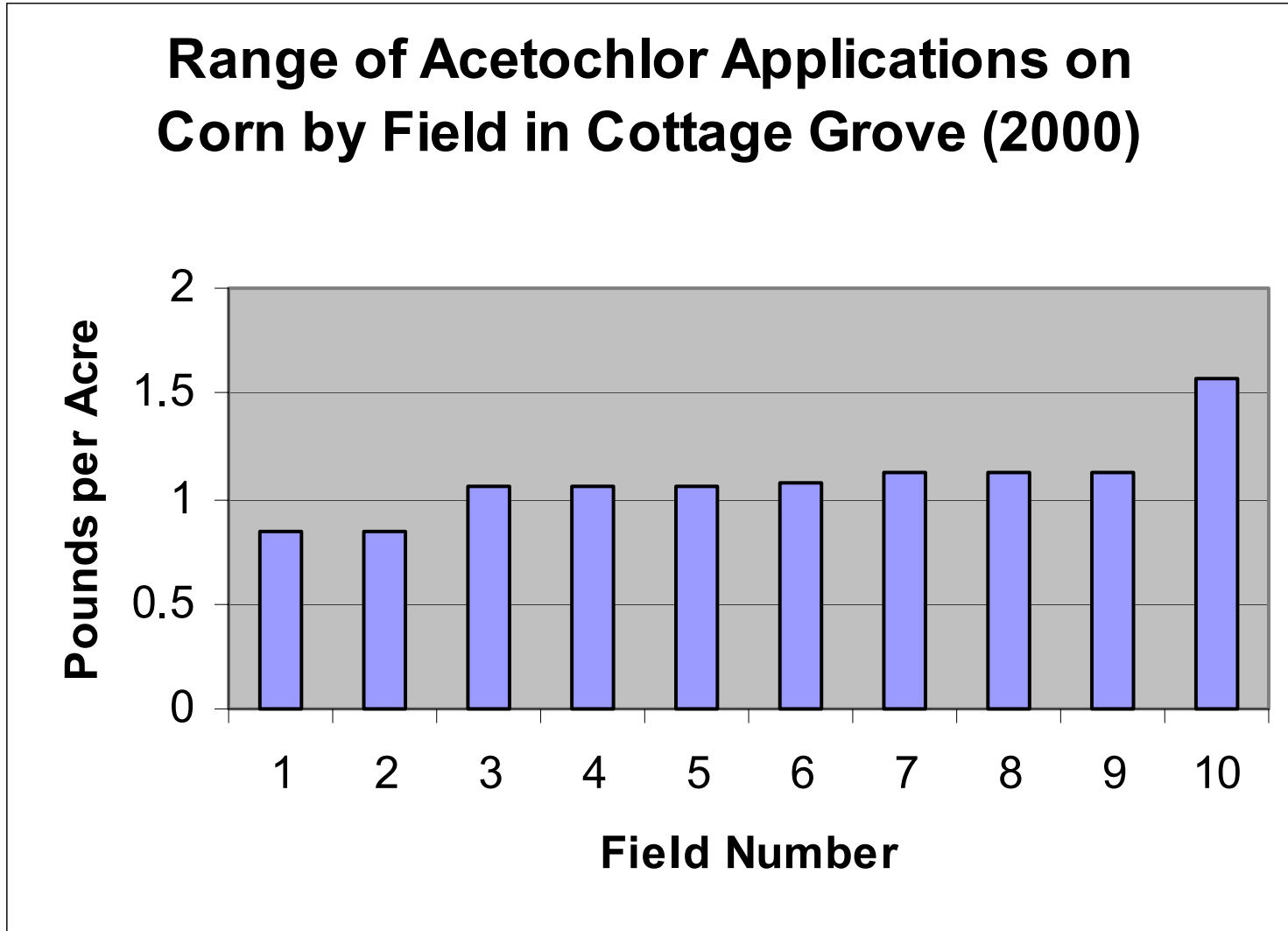


Figure 12. Range of acetochlor applications on corn acres for all survey projects by field.

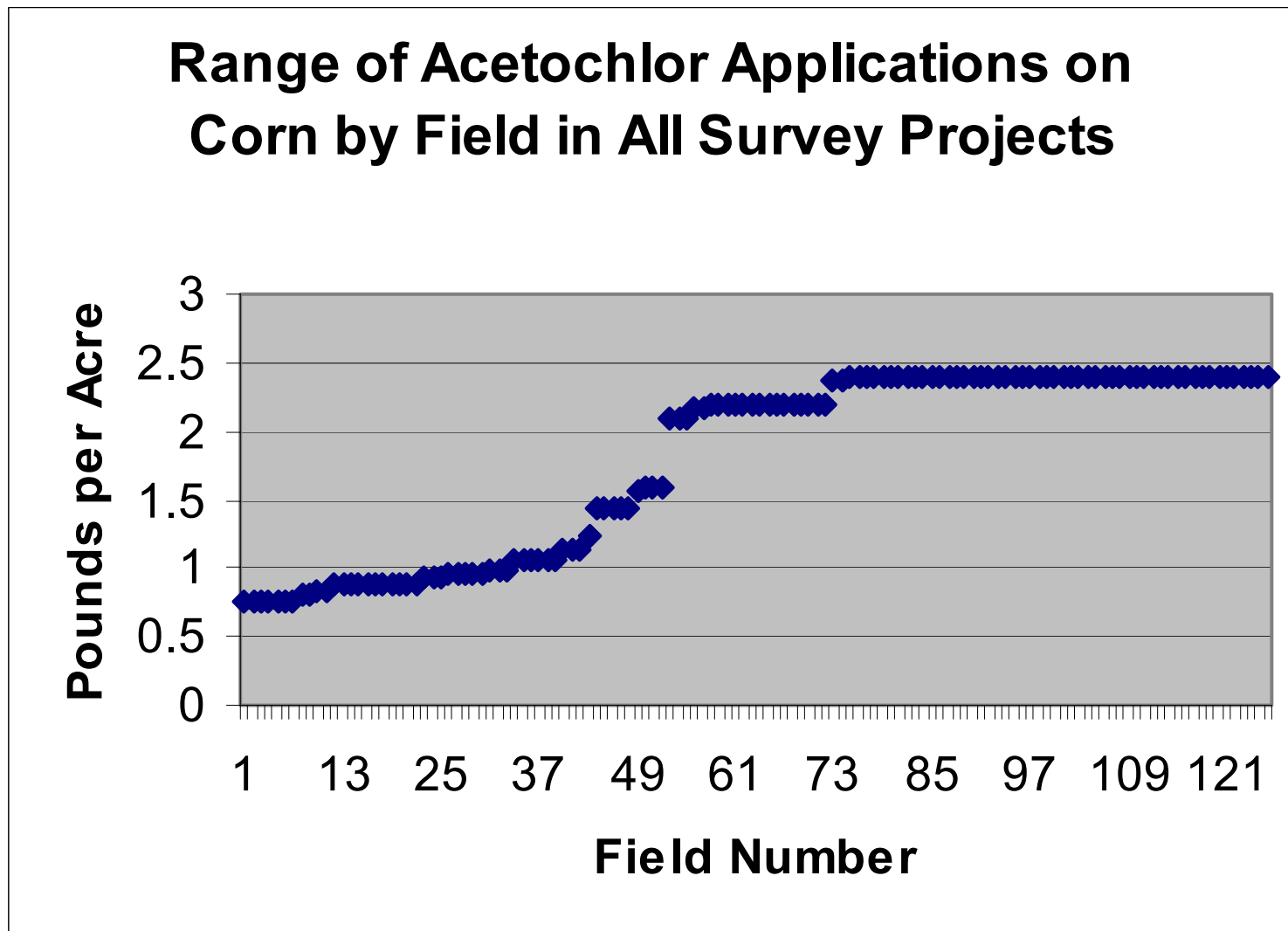


Figure 13. Range of dicamba applications on corn acres in St. Peter Wellhead survey project by field.

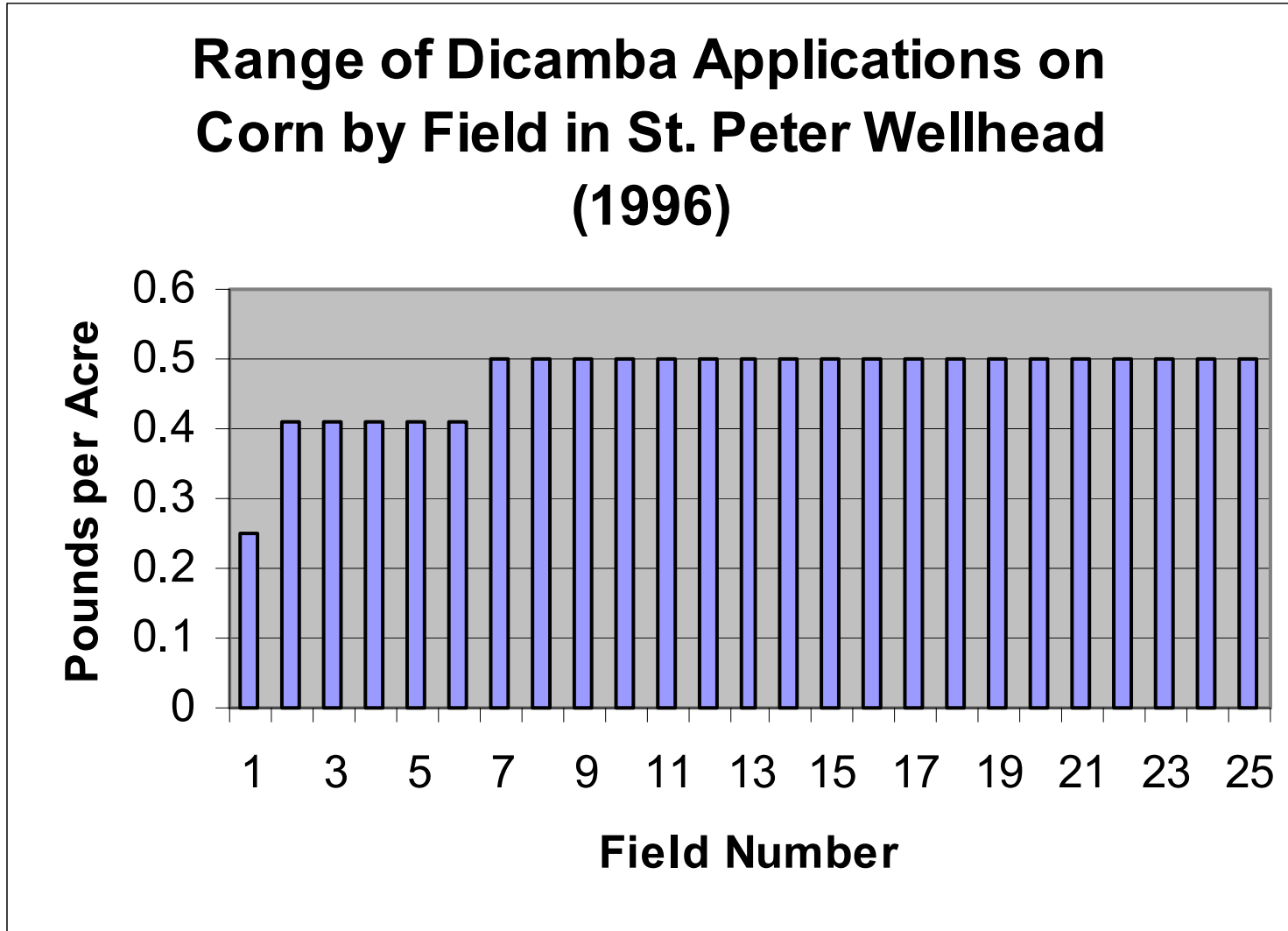


Figure 14. Range of dicamba applications on corn acres in Whitewater River survey project by field.

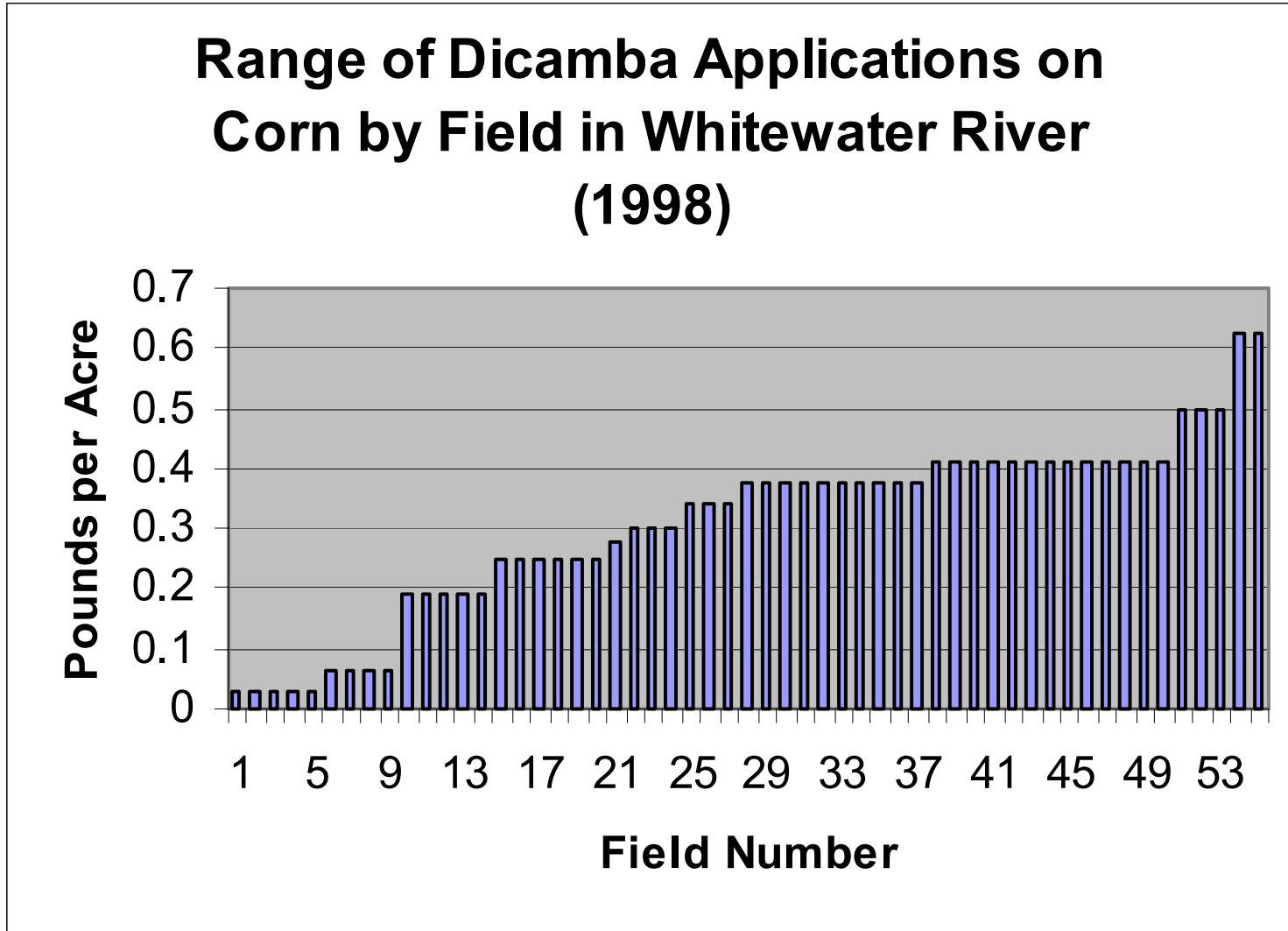


Figure 15. Range of dicamba applications on corn acres in Hastings Area survey project by field.

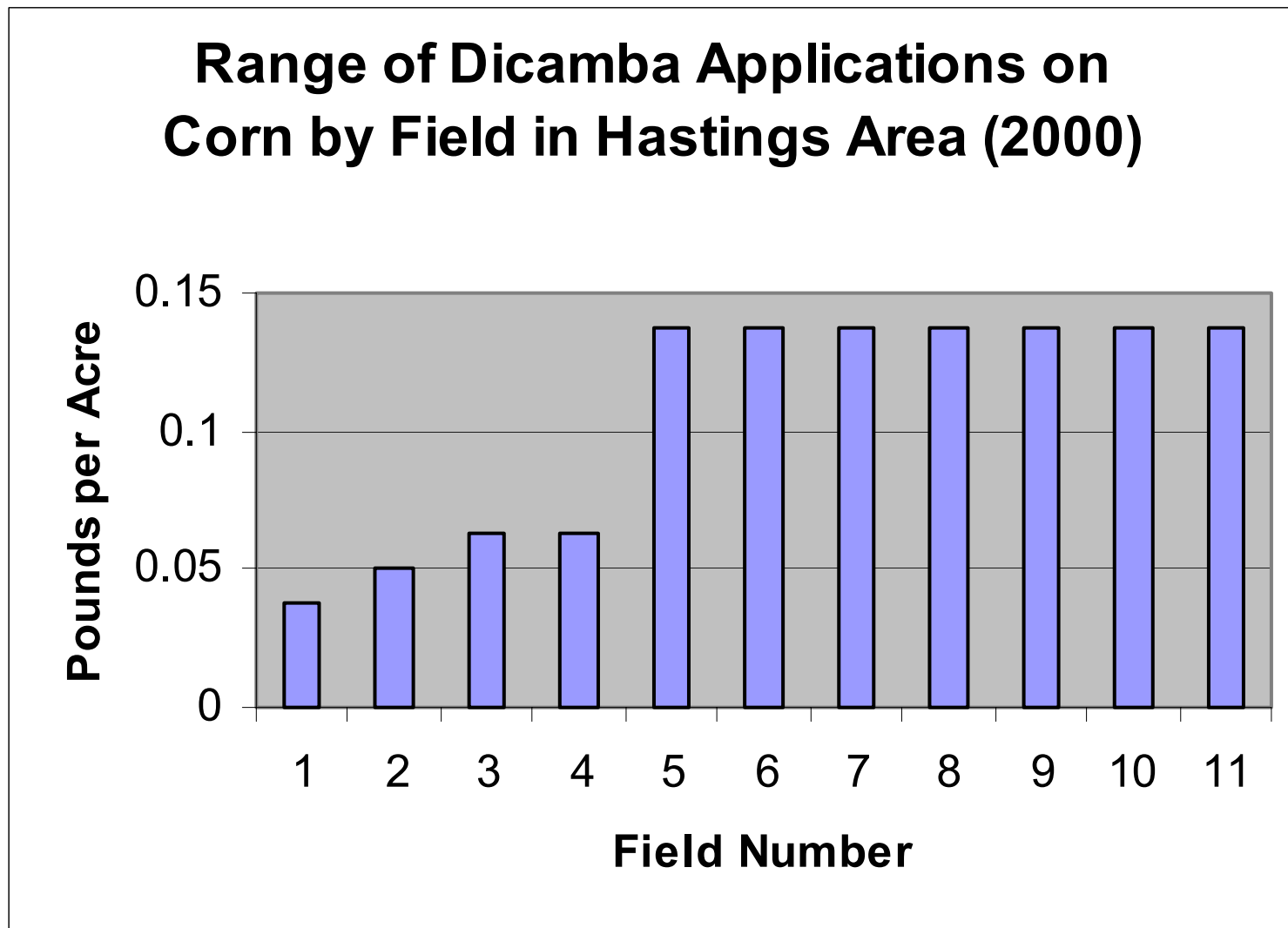


Figure 16. Range of dicamba applications on corn acres in Cottage Grove survey project by field.

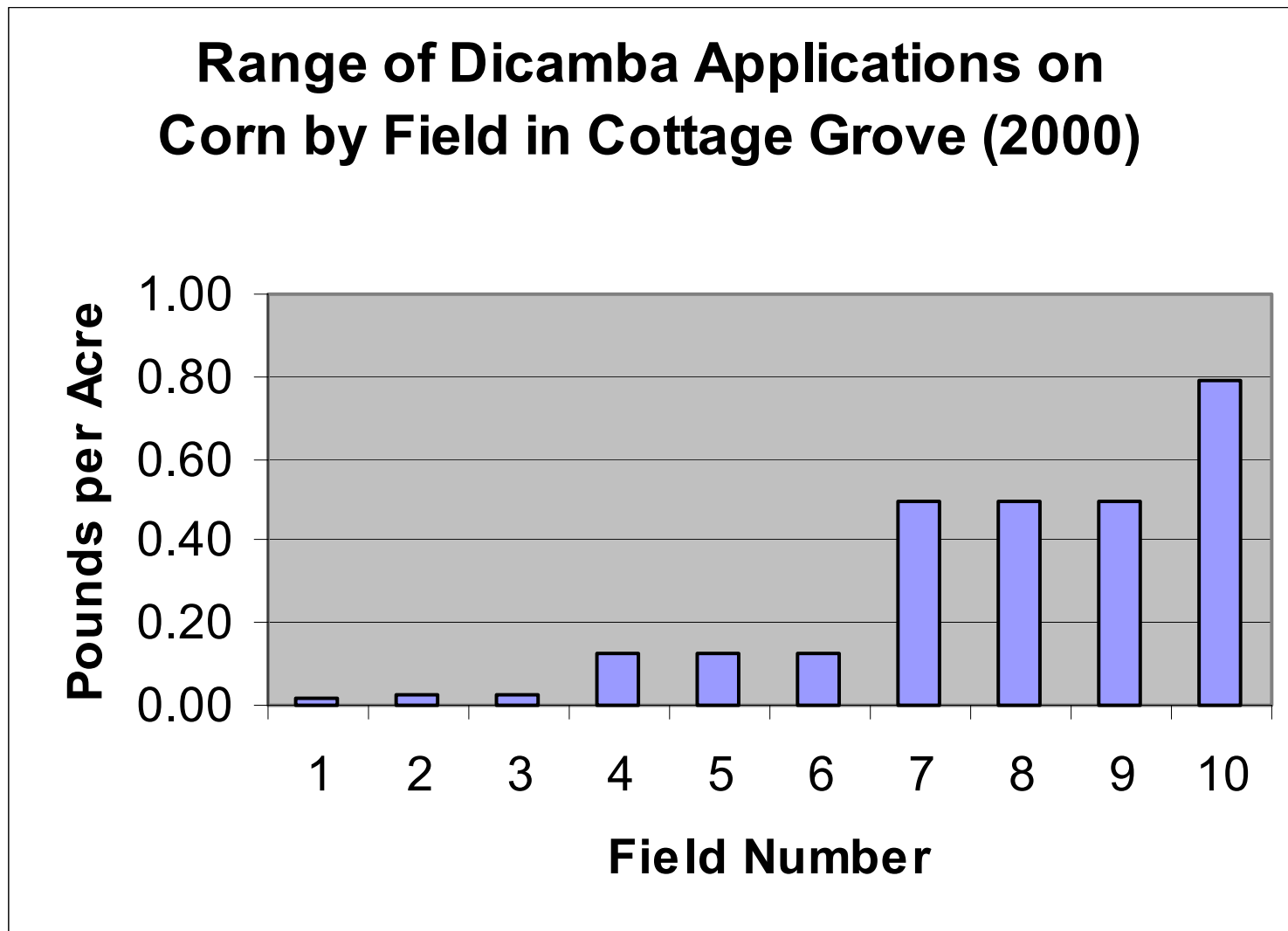


Figure 17. Range of dicamba applications on corn acres for all survey projects by field.

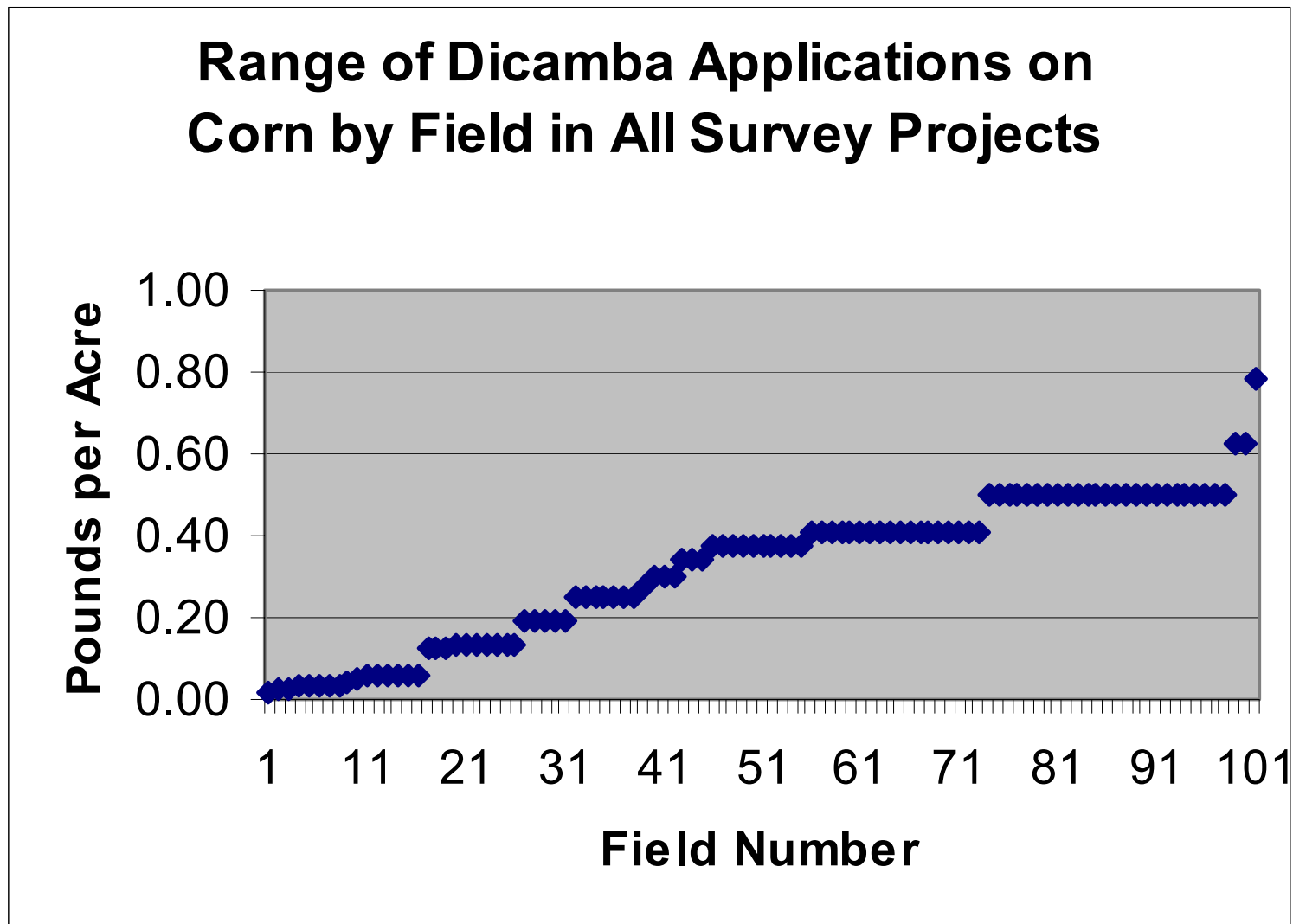


Figure 18. Range of metolachlor applications on corn acres in St. Peter Wellhead survey project by field.

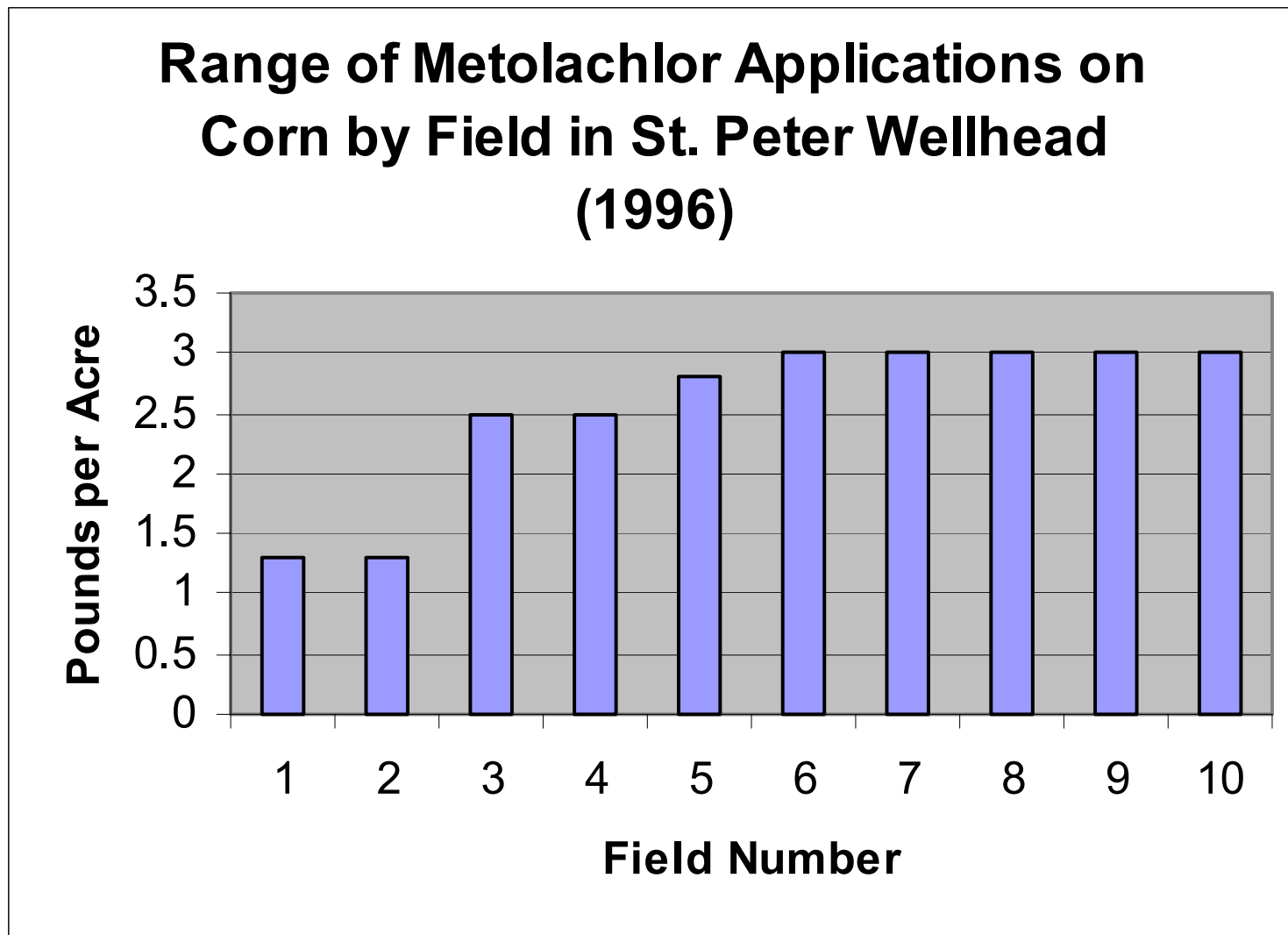


Figure 19. Range of metolachlor applications on corn acres in Whitewater River survey project by field.

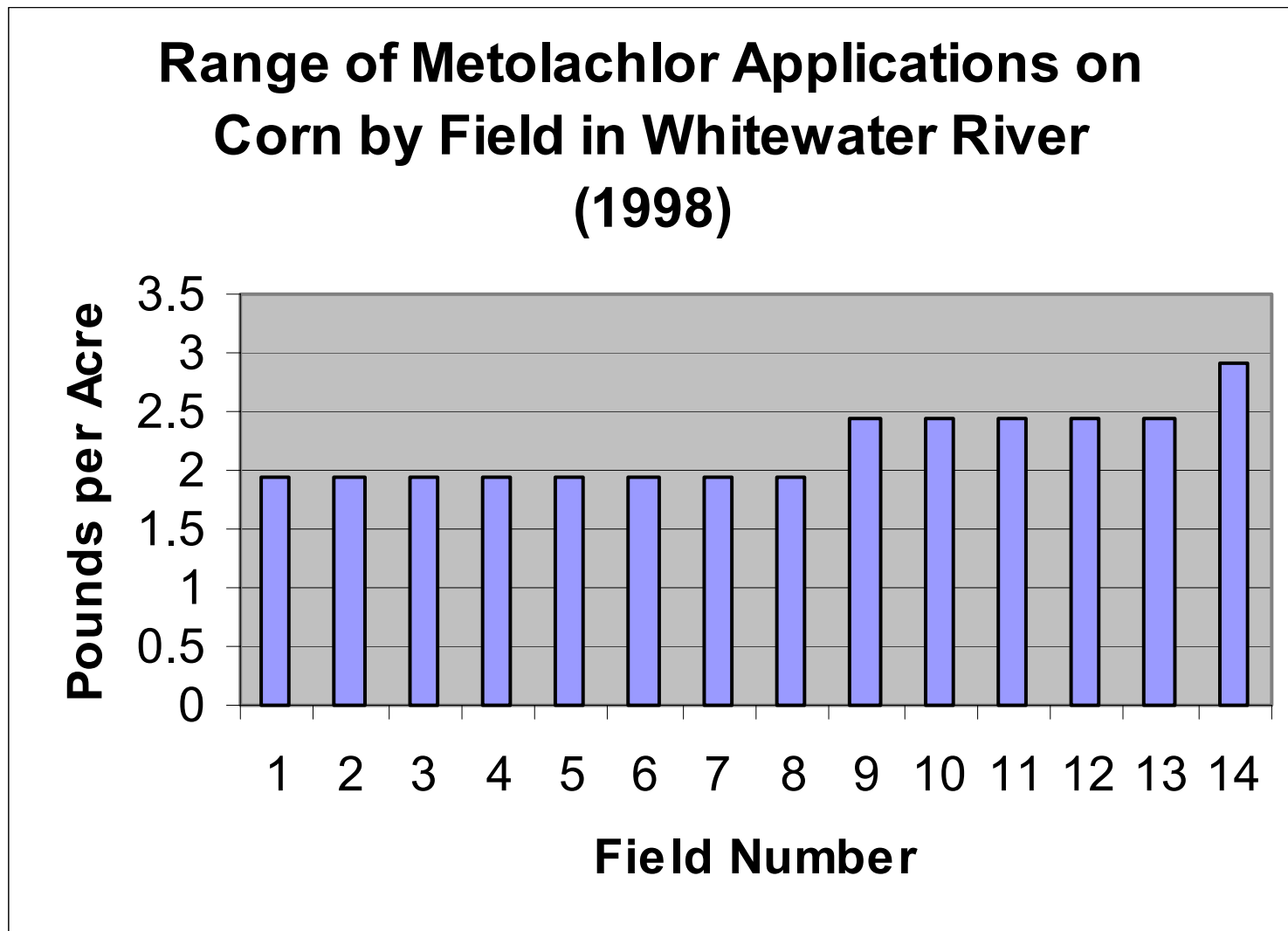


Figure 20. Range of metolachlor applications on corn acres in Hastings Area survey project by field.

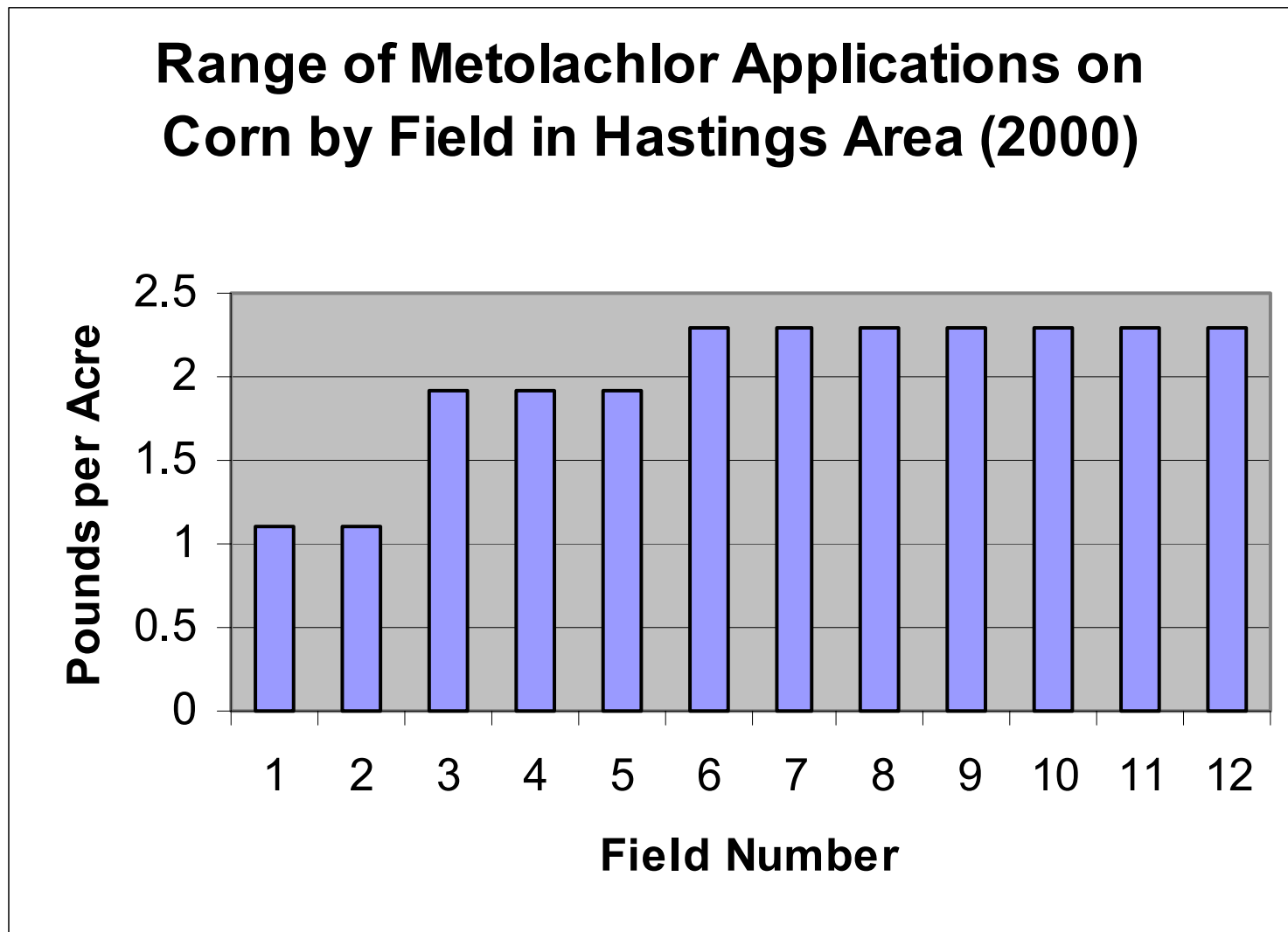


Figure 21. Range of metolachlor applications on corn acres in Cottage Grove survey project by field.

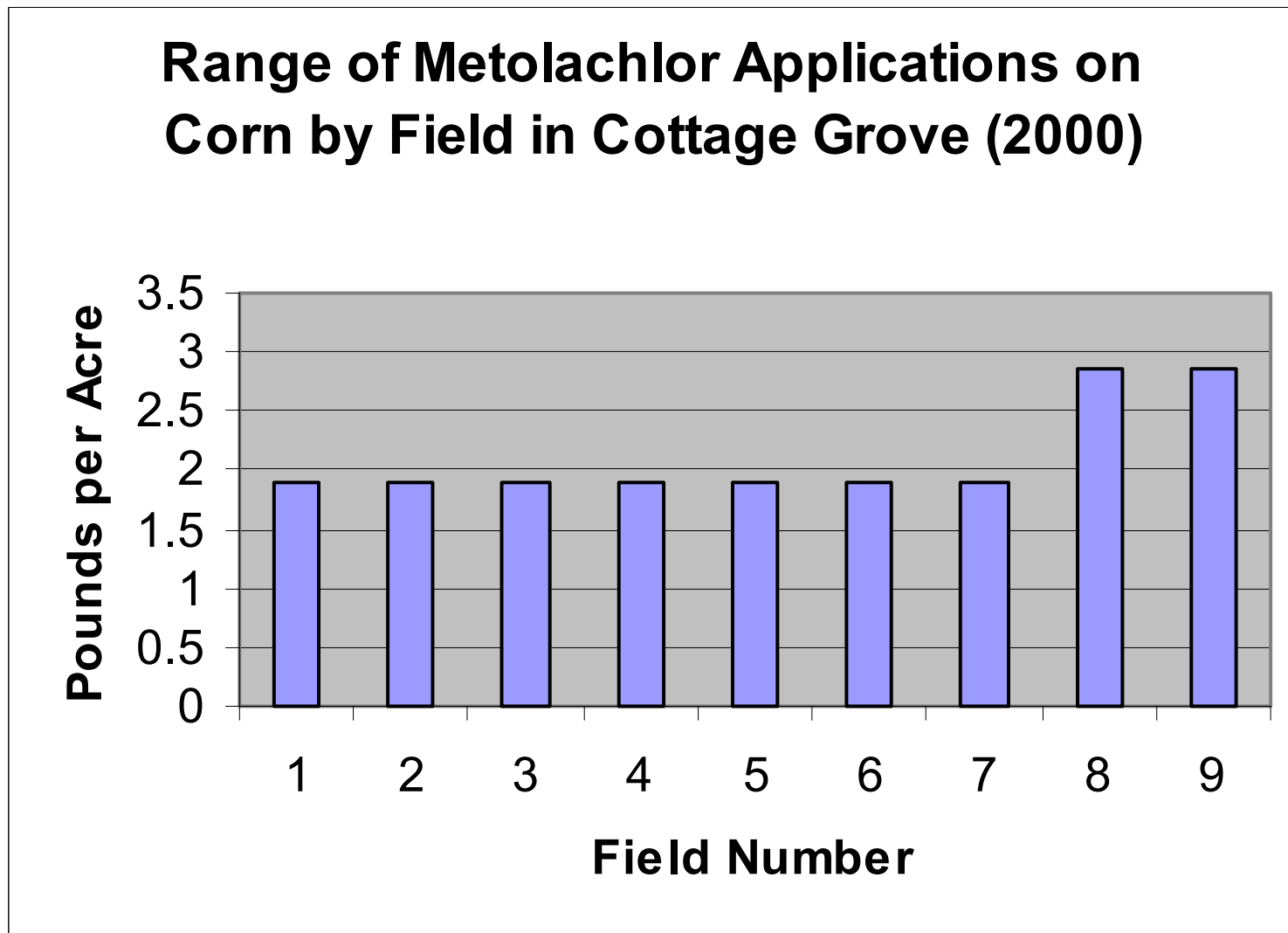


Figure 22. Range of metolachlor applications on corn acres for all survey projects by field.

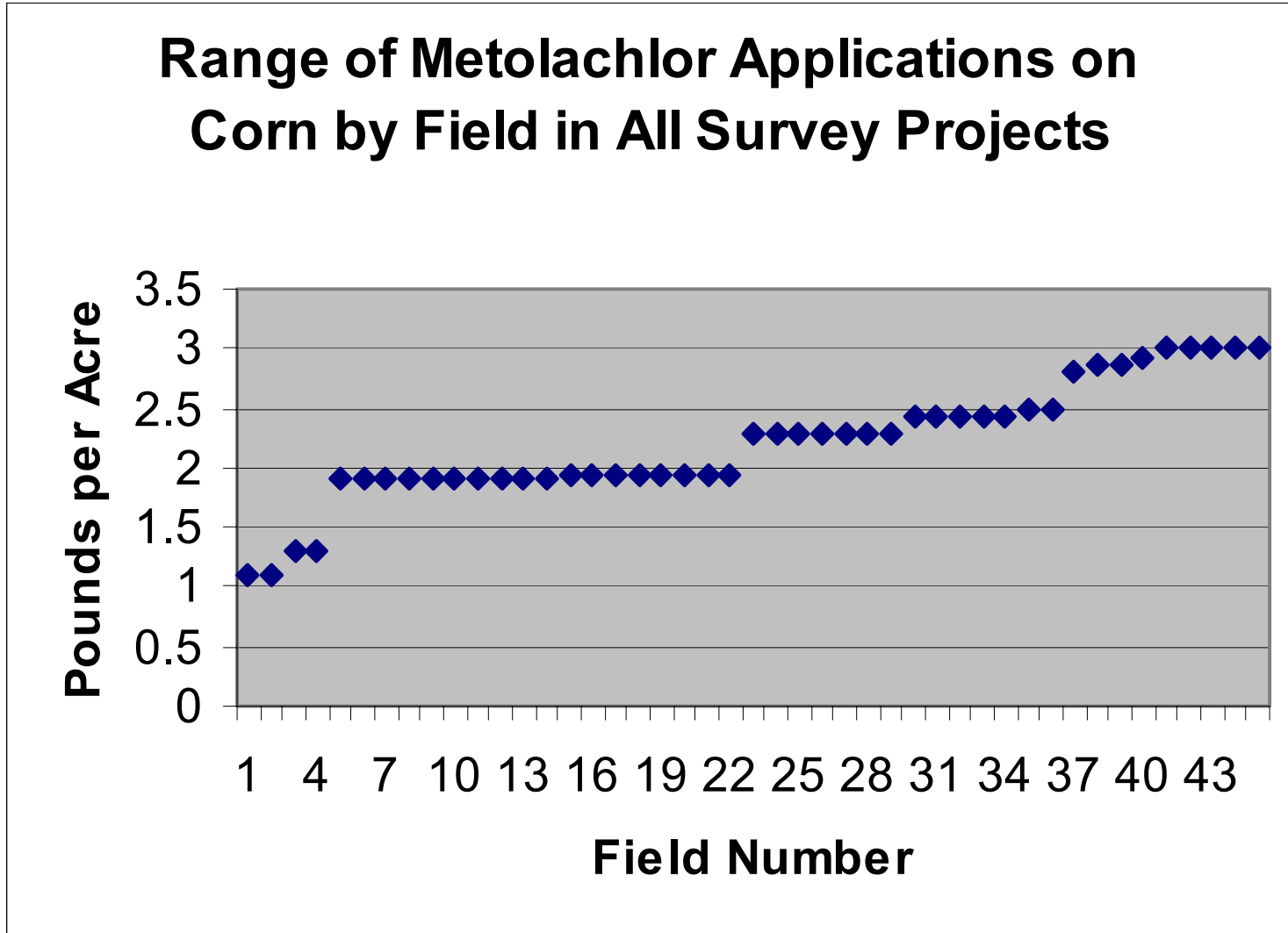


Figure 23. Range of 2,4-D applications on corn acres for all survey projects by field.

