



## 2012 National Sunflower Survey

Hannah Harwood, Crops & Soils Technician  
Dr. Heather Darby, UVM Extension Agronomist

For the third year, Vermont sunflower production data has been included in the National Sunflower Survey, which is initiated and organized by the National Sunflower Association. There were a total of 211 fields across the United States that were included in this study, with most fields being located in the Northern Plains. Fifteen fields were included in Vermont’s survey this year, including fields in Addison, Bennington, Caledonia, Grand Isle, and Orange counties. Sunflower production is increasing each year as Vermont growers refine their techniques, equipment, and agronomic knowledge. More work is needed to establish regionally-specific recommendations for sunflower production and to overcome pest pressures, but growers are enjoying the benefits of producing a portion of their own on-farm fuel, feed, fertilizer, and food.

The annual survey involves a visit to each field, and data collection on plant stand characteristics, pest pressure, and plant health. Seed samples are collected and sent to the USDA-ARS Northern Crop Science Lab in Fargo, ND for insect damage and seed quality evaluation (Figure 1). Potential yields are estimated by evaluating head diameter, seed size, plant population, pest damage, and the estimated percentage of good seed. It is important to note that because fields are surveyed weeks before harvest, in some cases, the calculated yields are generally higher than the actual harvested yields. Birds and disease issues can wreak havoc late in the season, and unfavorable drying conditions or weather events can make some of the field impossible to harvest. In addition, the total population and the actual harvestable population differ due to lodging, disease, and other pest incidence. In 2012, the average total population in Vermont fields was calculated at 23,309 plants per acre, though the average harvestable population was 19,864 plants per acre, indicating an average plant loss of 14.8% (Table 1).

**Table 1. Agronomic data for 15 sunflower fields in Vermont’s Sunflower Survey.**

Field #	Previous crop	Total plant population plants ac <sup>-1</sup>	Harvestable population plants ac <sup>-1</sup>	Calculated yield lbs ac <sup>-1</sup>	Row spacing inches	Tillage
1	Corn	28096	25918	1573	30	Conventional
2	Shell peas	22651	21432	1347	30	Conventional
3	Sunflower	18876	18005	1281	36	Conventional
4	Corn	19689	16553	1716	30	Conventional
5	Dry beans	27879	27182	1618	30	Conventional
6	Grass/hay	5925	5750	766	30	No-till
7	Sunflower	12371	10280	489	30	Conventional
8	Grass/hay	27356	22477	1766	30	No-till
9	Grass/hay	22826	14810	1717	30	No-till
10	Corn	28227	24219	2563	30	No-till
11	Soybeans	40947	27356	869	30	Conventional
12	Fallow	22826	21083	2054	30	No-till
13	Grass/hay	23000	21431	343	30	No-till
14	Grass/hay	21257	15334	577	30	No-till
15	Sunflower	27704	26136	763	30	Conventional
<b>Average</b>		23309	19864	1296		

Three of the fields were planted following a previous crop of sunflower, while five followed a grass/hay crop and three followed corn. The average calculated yield for Vermont sunflower was 1296 lbs per acre, though the calculated yields ranged from 343 lbs per acre to 2563 lbs per acre. The national average for oilseed sunflower in 2012 was 1508 lbs per acre (USDA, 2013). Of the 15 fields surveyed, only one had 36” row spacing; all others were planted in rows 30” apart. Almost half (7 of the 15) fields were no-till sunflowers planted into either hay or corn fields or fallow ground. All sunflower fields were oilseed-type varieties, grown without irrigation.

During the survey, the overall health of fields is assessed to determine the primary yield limiting factors. In a few cases, no yield limiting factors were identified; in most fields, however, one or two factors were acknowledged as likely to negatively impact yields (Table 2). Weeds were the top yield-limiting factor for sunflowers in VT.

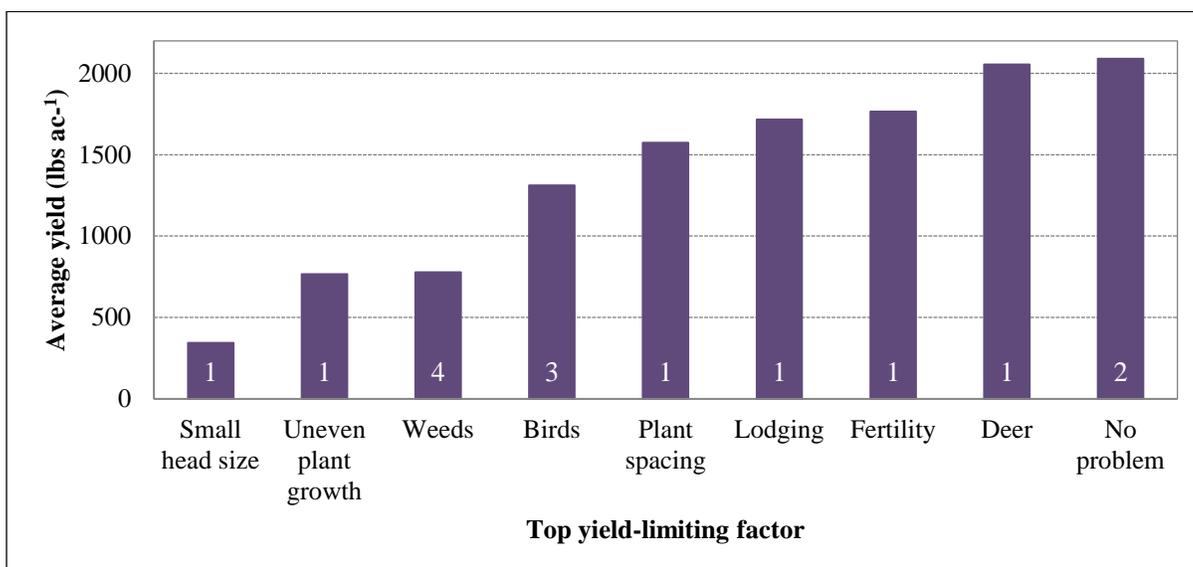
**Table 2. Factors that influenced 2012 sunflower yields, Vermont.**

Field #	Yield-limiting factors	
	1st	2 <sup>nd</sup>
1	Plant spacing	-
2	Birds	-
3	Weeds	Insects
4	Birds	Disease
5	-	-
6	Uneven plant growth	Weeds
7	Weeds	Uneven plant growth
8	Fertility	Weeds
9	Lodging	Birds
10	-	-
11	Birds	Weeds
12	Deer	Birds
13	Small head size	None
14	Weeds	Uneven plant growth
15	Weeds	Deer



**Figure 1. Sunflower seed is hand-threshed to determine insect damage.**

Average yields can be compared based on each field’s top yield-limiting factor; this helps to show the impact of given production problems on overall seed yields (Figure 2). Not surprisingly, fields with “no problem” had the highest seed yields. The field with “small head size” as its top limiting factor also had the lowest calculated yield.



**Figure 2. Average yield as impacted by predominant yield-limiting factors. White labels indicate the number of fields with the identified top yield-limiting factor.**

Lodging, when sunflower stems bend and break, can be a problem in Vermont, especially with wide heads or following extreme weather events. The most common type of lodging in Vermont’s 2012 survey was mid-stalk lodging, meaning the plant had bent and/or broken along the stem. Nine of the 15 surveyed fields had at least some mid-stalk lodging (Table 3). Sclerotinia, or white mold, can also diminish yields, and can cause three types of infection including whole plant wilt, mid-stalk rot, and head rot. While head rot is perhaps the most noticeable form from a distance, mid-stalk sclerotinia rot was most prevalent in Vermont fields (average 2% of sunflowers evaluated). Only a third of the surveyed fields had no form of sclerotinia at the time of the 2012 survey.

Birds are a documented pest in the Northeast; six of the 15 surveyed Vermont fields had notable bird damage in 2012. Average bird damage to seed heads was 6.7%, though the hardest-hit field had 35.3% damage. In the past three years, the severity of bird damage has increased; this year, among the 40% of fields that had bird damage at the time of the survey, the average bird damage was 16.8%. In 2011, eight fields were surveyed, and while 100% of them had bird damage, the average severity was only 8.9%.

**Table 3. Lodging and pest damage, Vermont, 2012.**

Field #	Lodging			Sclerotinia damage			Bird damage %	Sunflower midge damage %	BSM damage %
	% Root	% Ground	% Mid-stalk	% Wilt	% Mid-stalk	% Head			
1	0	0	0	0	2	0	0.0	0.0	10.0
2	1	1	2	0	0	0	6.0	0.2	2.0
3	0	3	1	0	0	0	0.0	0.5	28.0
4	0	0	1	0	3	0	9.8	0.5	4.0
5	0	0	0	0	0	0	0.0	0.0	2.0
6	0	0	0	0	0	0	0.0	0.1	5.0
7	0	0	0	0	7	1	0.0	1.7	31.0
8	0	1	2	0	0	0	0.0	0.0	0.0
9	0	6	22	1	10	2	8.5	0.6	0.0
10	18	2	2	0	0	7	0.0	0.7	0.0
11	0	1	14	0	11	0	29.7	0.5	0.0
12	0	0	1	0	0	7	35.3	0.0	0.0
13	0	0	0	0	0	1	0.0	0.2	2.0
14	0	3	18	0	3	1	11.6	0.3	0.0
15	0	0	0	0	1	0	0.0	0.2	0.0
<b>Average</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>6.7</b>	<b>0.4</b>	<b>5.6</b>



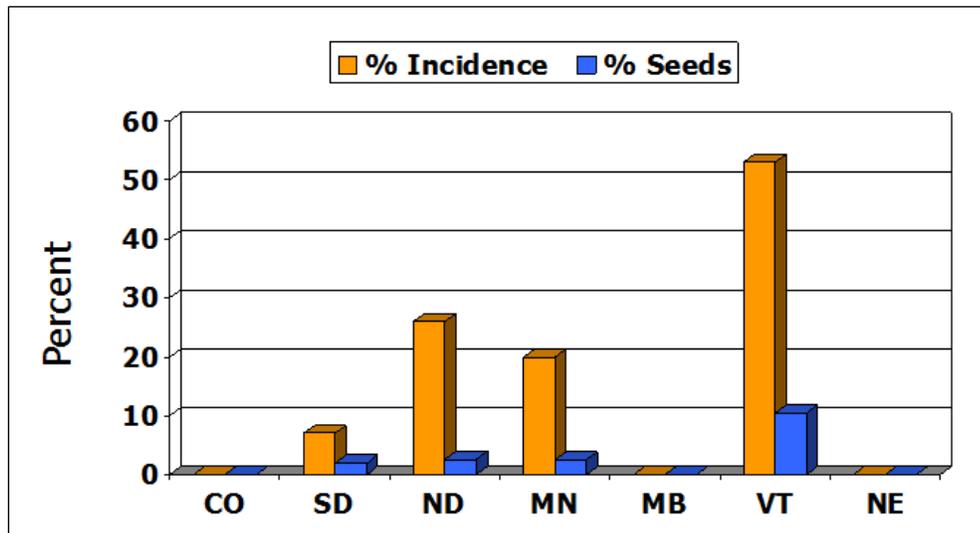
**Figure 3. This sunflower head would receive a midge damage rating of 4 (extreme cupping, thickened head). Head is not completely closed.**

Additional sunflower diseases were scouted for, including rhizopus, phoma, phomopsis, verticillium wilt, and red rust. Infection of these diseases was minimal in Vermont fields.

Sunflower midge damage, visible in the form of deformed, cupped heads, was present in nearly all of the surveyed fields, though severity ranged drastically. Surveyors evaluated the damage on 20 heads per field on a scale of 0 to 5, with 0 signifying no damage to the head and 5 indicating complete closure of the head (Figure 3). The average midge damage rating was 0.4, although field averages ranged from 0.0 to 1.7 in severity ratings.

Seed samples were mailed to North Dakota for further evaluation of insect damage, where samples were analyzed for seed weevil damage, banded sunflower moth (BSM) damage, sunflower moth damage, and kernel brown spot (caused by Lygus bug and unique to confection sunflower,

rather than oilseed). There was no insect damage in the Vermont samples, with the exception of BSM damage. Among the 10 states and provinces included in the 2012 national survey, Vermont's incidence of BSM damage was highest. Eight of the 15 samples had some BSM damage, and among fields with seed damage, the average severity was 10.5% (Figure 4). While this is actually a decrease from last year's seed evaluations (16.8% of seeds were damaged by BSM in 2011), it is clear that BSM has continued potential to decrease seed yields in the state. The insect burrows into maturing seeds as larvae, then feeds on the flesh of the seed and leaves a distinct "exit hole." Research is underway through the UVM Extension Northwest Crops & Soils Program on BSM monitoring and control.



**Figure 4. Banded sunflower moth damage incidence and severity across states and regions, 2012. National Sunflower Association data (Kandel, 2013).**

Overall, 2012 was a productive growing season, with favorable weather conditions. Vermont's calculated sunflower seed yield was 1296 lbs per acre. Considering that National Sunflower Survey calculated yields are typically about 10% greater than reported USDA statistics due to late-season yield limitations; Vermont's average for oilseed sunflowers is estimated between 1100 and 1200 lbs per acre in 2012. With an average oil content of 40%, this would equate to 440 to 480 lbs (or 57 to 63 gallons) per acre of oil.

## ACKNOWLEDGEMENTS

We are grateful to the fifteen sunflower producers who agreed to allow us to evaluate their fields to conduct this survey. Contributing to the national statistics on sunflower production, as well as collecting agronomic information on Vermont's sunflower crop, will help us to move forward with applied research, integrated pest management, and technical assistance to growers. Thank you also to Northwest Crops & Soils Program staff members Katie Blair, Scott Lewins, and Rosalie Madden, who helped with data collection during the survey. More information on sunflower production can be found at [www.uvm.edu/extension/cropsoil/oilseeds](http://www.uvm.edu/extension/cropsoil/oilseeds).

## REFERENCES

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- United States Department of Agriculture, National Agricultural Statistics Service. January 2013. Crop production 2012 summary. Available at <http://usda01.library.cornell.edu/usda/nass/CropProdSu//2010s/2013/CropProdSu-01-11-2013.pdf> [Online PDF]. Verified 29 Jan. 2013).

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