Figure 3. Effect of planting date and variety on oil yield. ***Vertical bars represent +/- one standard deviation.***

Effect of Planting Date

As expected, the earliest planted sunflowers (25-May) bloomed earliest, by 27-July. Sunflowers planted on 1-June bloomed by 2-August and the latest planted sunflowers by 8-August. Essentially for every one week delay in planting there was approximately a one-week delay in bloom.

The 1-June planting date resulted in a significantly higher plant population compared to the other dates (Table 3). Having all been seeded at a rate of 32,000 seeds per acre, this means that the establishment rates for the three planting dates varied from 53% to 81%. Sunflowers planted on the third planting date (7-June) were the tallest (55.4 inches) and also had the widest seed head (7.5 inches).

Table 3. Effect of planting date on agronomic characteristics of sunflowers.

Planting date	Population

Bird damage was lowest among the sunflowers planted on 7-June (6.6%) (Table 3; Figure 4). Lodging was significantly higher at the 1-June planting date than other planting dates. The incidence of white mold in the form of stalk rot was 6.7% in the first planting date (25-May), significantly lower than the second and third planting dates, which had 18.3% and 15.0% stalk rot, respectively (Table 3). There was no significant difference among planting dates for the incidence of white mold as either head rot or base rot.

Figure 4. Effect of planting date on incidence of lodging and bird damage. Treatments with the same letter did not differ statistically (p=0.10; compare capital letters for lodging and lower-case letters for bird damage).

At harvest, seed moisture content was highest for the 7-June planting date (Table 4). The moisture level was 21.0% for this third planting date, significantly higher than earlier planting dates. Seed yield was also highest for the third planting date of sunflowerses

Table 4. Effect of planting date on harvest yields and quality.

Planting date	Moisture at harvest	Seed yield	Test weight

DISCUSSION

The lowest plant establishment rates (64% and 53%) were in the earliest and latest planting date, respectively, and may have been due to weather events surrounding the plantings. In the week of the first planting date (25-May), northern Vermont had 5.67 inches of precipitation above normal, according to USDA weather data from Burlington, VT (30-year average from 1961-1990). The week of the second planting date (1-June), which had the highest emergence rate, also had above average rainfall, but slightly lower than the observed increase one week earlier (3.92r e-2(e)-2(k)1tT1 8j hnorma(1990))-T9he11(2r)0pi pltntlin dahee

Generally, early season planting allows the farmer to plant a full season variety. Full season varieties often yield higher as they have an extended growth period. Once the planting date is delayed often farmers must change to a shorter season variety that will be able to mature during the allotted growing season. If a full season variety is grown at later planting dates it may not have enough time to properly mature and yield potential and quality will be compromised. The goal of this project is to identify optimum planting dates as well as sunflower maturities for this region. The full and short season sunflower varieties in the study had varying oil yields depending on the timing of planting. The full season variety '7120' had higher oil yields when planted on the earliest planting date and the shorter season variety '306' had higher oil yields at the latest planting date. We would expect that the shorter season variety may outperform a later season variety as the planting date becomes delayed. Likewise we would expect a later season variety to outperform a shorter season variety at earlier planting dates. Further research needs to be conducted across a broader span of planting dates to confirm these predictions.

Planting date is a strategy that can be used to increase yields and quality of crops as well as manage pest issues. The first year of the study indicates that an early or later planting date may reduce pest issues and not impact yield or quality. The planting dates occurring in late May appeared to result in sunflower bloom and ripening close to pest and bird migratory patterns. While a general rule of thumb suggests that sunflowers should be planted as soon as possible after the spring soils have warmed to at least 50-55°F, 2011 was a very unusual year for weather. Wet soil conditions postponed spring planting for many Vermont growers, and Tropical Storm Irene, which hit Vermont in late August of 2011 with heavy rainfall and catastrophic winds, caused damage and difficulty in harvesting for many farmers. Especially with this anomalous weather, it is important to bear in mind that the results discussed here represent only one year's worth of data, and are specific to one location in northern Vermont. Decisions should not be based solely on this information, but rather a compilation of research across varying seasons and locations should be considered.

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