2020 Impact of Cover Crops on No-Till Spring Grain Production

Dr. Heather Darby, UVM Extension Agronomist Rory Malone and Ivy Krezinski UVM Extension Crops and Soils Technicians (802) 524-6501

2020 IMPACT OF COVER CROPS ON NO-TILL SPRING GRAIN PRODUCTION Dr. Heather Darby, University of Vermont Extension heather.darby[at]uvm.edu

Soil health is fundamentally important to crop productivity. Cover cropping is one method of improving soil health, by preventing soil erosion and nutrient runoff, improving soil aggregation and nutrients, as well as providing other benefits to soils and crop productivity. Cover crops have also been noted for their ability to suppress weeds. Some cover crops have been noted for their allelopathic characteristics, which can decrease the germination of weeds. No-till and reduced tillage practices can also increase water infiltration and reduce soil degradation while keeping carbon in the soil. Different types of cover crops, such as grasses, legumes, and brassicas, have different benefits for soil health and nutrient retention. Cover crops are even being utilized as a forage on dairy farms. There is a need for more research on cover crops to define the best species, varieties, and mixes for a Northeastern climate and for achieving higher cash crop yields. To examine the impact of winter terminated cover crops on yields of no-till spring wheat, the University of Vermont Extension's Northwest Crop and Soils (NWCS) Team conducted a field trial with cover crops planted fall 2019 and spring wheat grown in the 2020 field season. The suitability of the cover crops as forages were also examined.

MATERIALS AND METHODS

Winter terminated cover crops were planted on 15-Aug 2019 at Borderview Research Farm in Alburgh, VT with a cone seeder (Table 1). The experimental design was a randomized complete block with four

| Cover crop | Seeding rate lbs ac ⁻¹ |
|-------------------|--------------------------------------|
| Piper sudangrass | 50 |
| Wonderleaf millet | 30 |
| Everleaf oats | 125 |

Table 2. Cover crop treatments, 2019-2020.

2000) on the Perten FN 1500 Falling Number Machine. The falling number is related to the level of sprout damage in the grain. It is determined by the time it takes, in seconds, for a stirrer to fall through a slurry of flour and water to the bottom of a test-tube. Falling numbers greater than 350 indicate low enzymatic activity and sound quality wheat. A falling number lower than 200 indicates high enzymatic activity and poor-quality wheat. Deoxynivalenol (DON), a vomitoxin, was analyzed on one replicate using Veratox DON 5/5 Quantitative test from the NEOGEN Corp. This test has a detection range of 0.5 to 5 ppm. Samples with DON values greater than 1 ppm are considered unsuitable for human consumption.

Cover crop data were analyzed using a general linear model procedure of SAS (SAS Institute, 2008). Replications were treated as random effects, and treatments were treated as fixed. Mean comparisons were made using the Least Significant Difference (LSD) procedure where the F-test was considered significant, at p<0.10. Grain yield data were analyzed using a Mixed Model procedure of SAS. Mean comparisons were made using the Tukey-Kramer adjustment with a significance level of p<0.10.

Variations in genetics, soil, weather, and other growing conditions can result in variations in yield and quality. Statistical analysis makes it possible to determine whether a difference between treatments is significant or whether it is due to natural variations in the plant or field. At the bottom of each table, a LSD value is presented for each variable (i.e. yield). Least Significant Differences (LSDs) at the 0.10 level of significance are shown. This means that when the difference between two treatments within a column is equal to or greater to the LSD value

Table 3

Grain yields in the cover crop treatments were similar, **and**coutyielded the control (Table 6, Figure 1). The only statistically significant metric was harvest moisture, where the barley had a significantly lower moisture (17.3%) than the sudangrass (21.4%). The mix had the highest wheat yield at 13% moisture, yielding 963216xtaat 73/0040660035027F6121794 TeWinQh Tidhad 7deWinBhWFgOTC41 and 74660000ET2Q06342 %927r6W hB2.0E