Figure 1. Our season extension covers under snow and frost stress. Diobetalon and 30% row cover layered (A), Solexx (B), and control with plastic chicken wire (C).

Growing Winter Greens at High Elevations Using Season Extension Covers

Introduction

In high elevations, if it suggested to gardeners that cool season crops like most greens will be the crops that could do well in the climate conditions. Because they are already cool season crops, there often is not any advice on additional techniques to use to increase yield or quality. The CSU Extension office in San Miguel Basin wanted to test this advice and see if there was a way to get stronger yields by growing using season extension practices and they wanted to test if cold hardy green could be grown through the winter. Season extension is the practice of extending the frost-free growing season length to add to the time and create better growing conditions a specific crop needs to produce good quality yield. Locations at high elevations, such as Telluride, CO (8,750 ft.), experience shorter growing seasons and cooler nighttime temperatures, so they could benefit from these season extension practices. To test different methods of extension we grew 'Winter Red Russian' kale, 'Vit' mache, and 'Tyee' spinach under different covers in 2011/2012, and 2012/2013(Figure 1). The covers included a control, 30% row cover material layered with Diobetalon, and a Solexx rigid roof. The San Miguel Basin CSU Extension office has provided literature of the advantages and disadvantage of these different season extension covers which can be found here or on their website. The average yield in ounces for kale, mache, and spinach were calculated for each of these treatments.

How We Grew High Elevation Winter Greens

In areas where temps drop below freezing and soils freeze, growing in a raised bed with a cover can help you keep plants alive longer. The benefits of these raised beds can also be increased by utilizing a season-extension cover over the crop like fabrics, hard plastics, or plastic sheeting. In our study we chose materials for our covers for the best light permeability and aeration for the crops.

Key Words: Diobetalon, Solexx, Row Cover Fabric, 'Tyee' Spinach, 'Vit' Mache, Kale 'Winter Red Russian'

Our raised beds were filled with native soil and amended with compost and/or peat moss. We also used straw as a ground cover because this helps with weeding and insulating the temperature of the soil. By growing in raised beds with the combination of a row cover you can also see benefits in pest prevention whether it is disease, insects, or some of the larger pests seen in higher elevations such as rabbits and deer.

Our Planting Dates.

Planting dates were consistent across the seasons we planted in. In 2011/2012 and 2012/2013, our plants were seeded in early to mid-September. The 2012/2013 trials were planted across three dates to allow for perpetual harvest. Across the seasons that we conducted trials, there were different methods of direct seeding utilized including broadcast and row planting. When planted as rows, our wintergreens were spaced as follows. Spinach was planted in rows 10 inches apart with plants within rows 6 inches apart. Mache rows were 6 inches apart with plants only two inches apart within a row. Our kale plants were in rows 10 inches apart and spaced 4 inches from each other. Germination cloth was kept on tops of the seedlings until they had a second set of true leaves to retain moisture and help them establish. Our mache was thinned two to three times per season so that the plants were two to four inches apart. Watering was performed on a per need basis because of frequent snows during our growing seasons.

How We Fertilized

Our trials were focused on organic production, so we chose to use organic sources of fertilizer for our winter greens. We fertilized our plants with the first round of fertilizer occurring right before seeding and again in February/March. Blood meal is a dry powder fertilizer source, so we mixed it into the soil initially and then applied near our plants following the application rates recommended on the package for best success.

Figure 2. Corn mache grown under a season extension cover.

How We Harvested

Winter greens are a leafy crop which means not all varieties have a single harvest in a season. Our mache when harvested was removed as a whole plant, and harvests were recorded when we thinned our seedlings. Spinach was harvested by removing 1/3 of the leaves two to three times in a season and recorded the average weight per plant. Kale was harvested as a whole plant and did not have any successful harvests in the 2011/2012 season.

Pro Tips/Observations

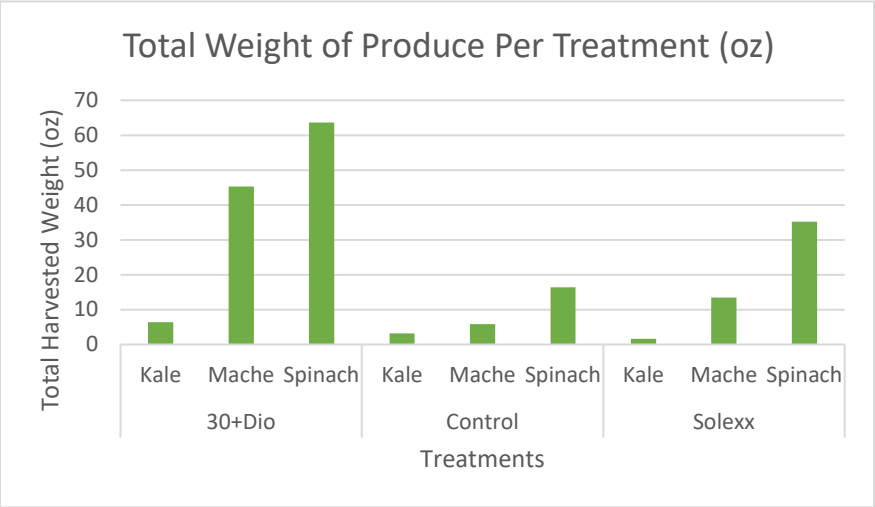
- Kale did not overwinter well unless it was more mature before the hard frosts.
- Wintergreens will produce a harvest around the holidays, but then won't produce another harvest until February or March when the day length begins to increase.

Differences in Season Extension Covers

The control in our study was a raised bed without a crop cover and the two other covers that we tried were a rigid Solexx cover and a fabric 30% row cover layered with Diobetalon material. Covers were

applied on a hoop structure placed on top of the raised bed edges. The control also had a hoop structure with plastic chicken wire over the top for protection from pests like deer and rabbits. Our Solexx treatment in 2014 had a structure closer to a greenhouse with a top panel that allowed access to the plants inside.

The three crops that we grew in our trials performed consistently with each other within the three treatments. Kale grown in the 2011-2012 season died from frost, so our data comes from the 2012-2013 season. The 30% row cover and Diobetalon layered cover greatly outperformed the other treatments so we would suggest using this combination as a season extension cover for kale grown at high elevation.



For each crop the control treatment performed worse. These plants were grown during the snowiest and coldest months of the year and our control plants were subjected to more frost and snow stress. By using covers, we were able to provide our crops with some protection from the elements and regulate temperatures. If you would like to grow winter greens in high elevation conditions like Telluride you should use season extension covers to successfully grow winter greens throughout the winter.

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