



Figure 1. Mara de Bois berries growing in 2019.

Growing Strawberries at High Elevations Using Season Extension Covers

Introduction

Often growers in higher elevations are told that growing strawberries there will have lower success, especially June-bearing varieties which are susceptible to late spring frosts and only have one shot of producing fruit. The CSU Extension office in San Miguel Basin wanted to test this advice and see if there was a way to get higher yields by growing **day-neutral** varieties using season extension practices. Season extension is the practice of extending the frost-free growing season length to add to the time and create better growing conditions specific crops need 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 three day-neutral varieties of strawberries under different season extension covers in 2018 and 2019. The strawberry varieties included Mara de Bois, Seascape, and Albion and the covers included a control, 17% row cover material, a rigid Solexx cover, and Diobetalon (Figure 1). 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 fruit yield and the average ounces of fruit per plant were calculated for each of the varieties and each of these cover treatments.

How We Grew High Elevation Strawberries

In areas where temps drop below freezing and soils freeze, growing in a raised bed can help you lengthen plant production. 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. Our study looked at two of these categories by growing plants under a 17% row cover, Solexx, and Diobetalon coverings. These materials were chosen for the best light permeability and aeration for the crops.

Our raised beds were filled with [native soil](#) and amended with compost and/or peat moss. We also placed straw on top of the soil as a mulch because this helps with weeding and insulates the temperature of the soil. Extra straw was added before overwintering and was removed at the beginning

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of the season in our second year. By growing in raised beds with the combination of a cover we saw benefits in pest prevention whether it was disease, insects, or some of the larger pests seen in higher elevations such as rabbits and deer.

Our Planting Dates



Figure 2. Strawberries grown under row cover.

For our trials we chose to grow day-neutral varieties because they produce fruit over a longer period. We started our strawberries from bare root plants by transplanting them into our raised beds in early May of 2018. It is important at higher elevations to plant once the ground is no longer frozen for the best transplanting success. Our plants were overwintered in 2018 until the 2019 growing season, so we only had one planting date. We chose to grow our plants for only two years because we needed the space in the raised beds to trial other crops. If you would like to have your space dedicated to strawberries, you can continue your plants in that space for more years than we did.

How We Fertilized

Our trials were focused on organic production, so we chose to use organic sources of fertilizer for our strawberries. We fertilized our plants with blood meal every three weeks. Blood meal is a dry nitrogen fertilizer source, so we evenly distributed it across the beds making sure to follow the application rates recommended on the package for best success. We fertilized our plants from when they began growing in our beds through late August to make sure nitrogen was available for our plants to produce fruit all season long. We removed the first round of blooms and runners and regularly removed runners to optimize nitrogen use and fruit yields.

How We Harvested

Day-neutral strawberry varieties can be harvested throughout the season, regular harvest optimizes fruit production. We harvested the fruit once they were uniformly red and firm. They began getting ripe in early to mid-July and were harvested through the middle of October. We checked our plants and harvested every other day or every few days to avoid rotting fruit. When harvesting the fruit, we cradled the berries in our hands, and pinched them off the calyx (the green leaves at the top of the fruit) to allow the berry to pop off nicely without bruising. We observed that the Mara de Bois (MB) variety had the highest overall yield in both berry number and ounces of fruit per plant. The fruit size was more variable than you would see from fruit sold at the market (Figure 3). Seascape (SS) did well but did not produce nearly as much as the MB variety. Albion (AB) performed much worse than either of the other varieties, so it does not seem that this one performs well in the high elevation conditions of Telluride.



Figure 3. Mara de Bois fruit at harvest.



Pro Tips/Observations

- Lygus bugs can harm your strawberry plants. Their feeding causes the ends of the strawberries to compress and the seeds to smash together (Figure 4).
- Season extension covers should be opened occasionally when weather conditions are nice to allow access to pollinators.



Figure 4. Lygus bug impact on strawberries.

Average Number of Berries Per Plant

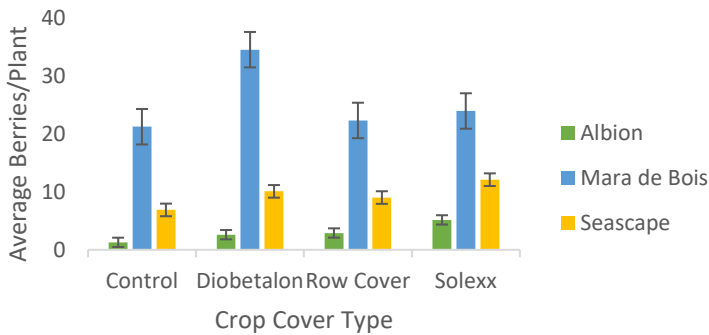


Figure 5. Berries per plant by treatments and varieties.

Total Yield Per Season Extension Treatment

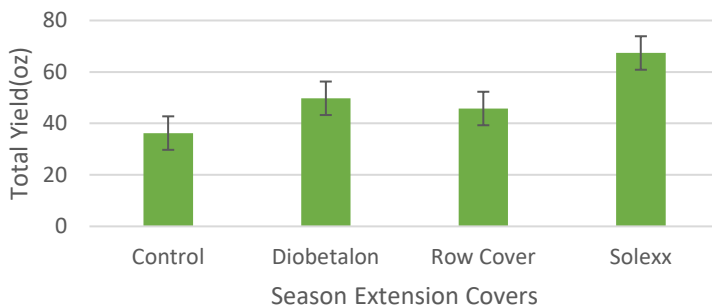


Figure 6. Total fruit yields by treatments.

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Differences in Season Extension Covers

The control in our study was a raised bed without a crop cover and the three other covers that we tried were a hard Solexx cover, a fabric cover called Diobetalon, and a 17% row cover. The two fabric 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 had a structure closer to a cold frame greenhouse with a top panel that allowed access to the plants inside.

For our highest fruit-yielding variety, Mara de Bois, the Diobetalon treatment statistically proved to be the best for the average number of berries per plant and the average ounces of fruit per plant (Figure 4a.). In our other varieties, SS and AB, the Solexx treatment outperformed the Diobetalon cover in both fruit yield characteristics.