



Figure 1. Summer squash under row cover fabric (A), control (B), Solexx (C), and Diobetalon (D).

Season Extension of Summer Squash in High Elevations

Introduction

Often growers in higher elevations are told that growing warm season crops like summer squash will be low yielding. The CSU Extension office in San Miguel Basin wanted to test this advice and see if there was a way to get stronger yields using season extension practices. Season extension is the practice of extending the frost-free growing season length and to 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 which increase air and soil temperatures. To test different methods of season extension we grew three different summer squashes in 2013 and four different zucchini varieties of summer squash under different covers in 2020 (Figure 1). The squash varieties included ‘Englischer’, ‘Lemon’, ‘Early Golden’, ‘Cocozelle’, ‘Costata Romanesco’, ‘Dark Star’, and ‘Ronde de Nice’ and the covers included a control, 17% row cover material, a Solexx roof, Diobetalon, and a greenhouse made of layered Diobetalon and 30% row cover material. 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 treatments.

How to Grow High Elevation Squash

In areas where temps drop below freezing and soils freeze, growing in a raised bed can help you keep plants alive longer. The benefits of these raised beds can also be increased by utilizing a season-

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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.

Our raised beds were filled with [native soil](#) and amended with compost and/or peat moss. We also used straw as a mulch because this helps with weeding and insulates the temperature of the soil (Figure 2). 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.



Figure 2. Zucchini grown in straw groundcover.

Our Planting Dates

We started our summer squash by direct seeding them into the raised beds in late June in 2013 and mid-June in 2020. It is important at higher elevations to plant once the ground is no longer frozen and after danger of frosts for the best success. 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. We thinned to 1-2 squash plants every 3’.

How We Fertilized

Our trials were focused on organic production, so we chose to use organic sources of fertilizer for our squash. We fertilized our plants with blood meal every 3-4 weeks. Blood meal is a dry nitrogen fertilizer source and should be placed in the root zone of the plants making sure to follow the application rates recommended on the package.

How We Harvested

When summer squash is grown under covers, pollination rates can be affected so we hand pollinated our plants. In 2020 we hand pollinated every time we were in the garden to overcome slow fruit set. The squash were harvested when they were still young and tender. In 2013, we harvested our plants from the middle to the end of September. There was a hard frost that month, so our yields and harvest window were shorter than hoped. With the issues with frost, we chose to plant our 2020 zucchini earlier in the year to allow for harvests throughout the summer. We began harvesting our zucchini in the middle of August and performed our final harvest at the end of September. We checked our plants and harvested every few days to optimize picking fruit at its peak ripeness. When harvesting the fruit, we held the zucchini in one hand and used pruners in the other to cut the vine 1 or 2 inches from the top of the fruit (Figure 3).



Figure 3. 2020 zucchini yield.

Pro Tips/Observations



- You may need to hand-pollinate if you are not getting a good fruit set.
- Harvest summer squash when young and tender (usually less than 8", depending on variety).

Differences in Crop Covers

The control in our study was a raised bed without a crop cover and the other covers that we tried were a hard Solexx cover, a fabric cover called Diobetalon, and 30% and 17% row cover material, and a cover made of 30% row cover material and Diobetalon together. The 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 was attached to a similar hoop structure in 2013. and had a structure closer to a cold frame greenhouse with a top panel that allowed access to the plants inside in 2020.

The zucchini yields in 2020 were much higher than the summer squash yields in 2013. This likely was the impact of only planting half the bed, the early hard frost and the later planting in 2013 leading to a shorter harvesting window. In the 2013 crop the Solexx was the highest performer with an average yield per plant almost three times the yield of 30% row cover fabric plus diobetalon cover. The control failed to provide squash that season (Figure 4).

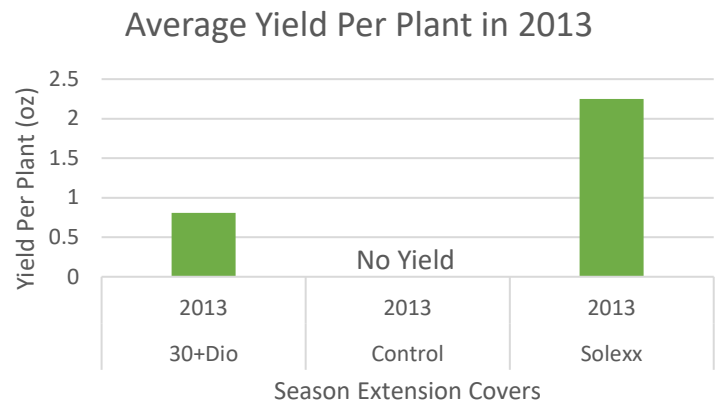


Figure 4. 2013 Fruit yield per plant in a treatment.

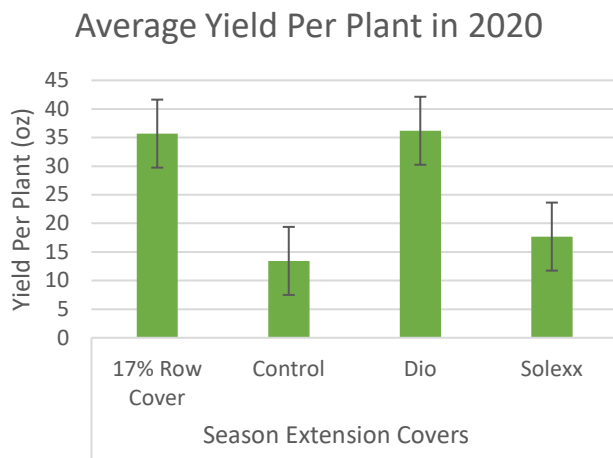


Figure 5. 2020 Fruit yield per plant in a treatment.

In the 2020 season, the Diobetalon and 17% row cover materials individually performed equally well and outperformed the control and Solexx treatments (Figure 5). Either of those treatments would make a great season extension cover for zucchini summer squash. The Solexx yielded higher than the control so on a per plant basis there is a benefit to using it as a raised bed cover. We did not observe any significant differences between the zucchini varieties. Cocozelle grew fewer larger zucchinis and both Ronde de Nice and Costata Romanesca both grew more fruit that were smaller. Dark Star performed the worst overall, so it likely does not yield well in the Telluride climate.

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