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Rhubarb (Rheum rhabarbarum) is not commonly grown in the North Carolina Piedmont, owing to its sensitivity to high temperatures and because it is not common in traditional local cuisine. However, many people have moved to the region from places where rhubarb is popular. Winter temperatures are appropriate in the North Carolina Piedmont for new leaf bud formation¹, but temperatures above 75 F can stress rhubarb, leaving it susceptible to pathogens, and therefore less viable as a perennial crop in the region. Previous research from the North Carolina Piedmont² has demonstrated that rhubarb can be can be propagated from seed and grown as an annual, where planting and harvest coincide with annual strawberry production. The objective of this study was to evaluate the feasibility of growing and marketing rhubarb as an annual crop alongside the regional strawberry production, and to observe differences in yield and quality between rhubarb grown on different colors of plastic.

Materials and Methods

In summer 2016, rhubarb 'Victoria' was propagated from seed in propagation trays with soilless media at the North Carolina Department of Agriculture and Consumer Services (NCDA & CS) Piedmont Research Station in Salisbury, NC. Pre-plant fertilizer (600 lb A⁻¹ 10-10-10 and 100 lb A⁻¹ 0-0-60) was incorporated into the field prior to plastic laying and transplant, according to soil test results (NCDA & CS Soil Testing Lab, Raleigh, NC). Seedlings grew in a greenhouse for 10 weeks and were transplanted on September 20 into 5 non-replicated treatments, each consisting of one 190' row. The treatments were: black, red, silver, and white plastic mulch, and bare ground, each with one row of drip tape. In-row spacing was 2'. Annual ryegrass (Lolium multiflorum) was broadcast between rows, and due to rapid growth, 2.9 oz A⁻¹ sethoxydim was applied on December 22 to control growth but not terminate the rye. Mefenoxam (14.5 oz A⁻¹) and imidacloprid (4.3 oz A⁻¹) were applied on October 26 to control Pythium spp. and aphids, respectively. In December 2016, laboratory testing revealed that a foliar bacterial infection was present, and all affected leaves were removed manually. On February 16, 1.4 oz A⁻¹ pymetrozine was applied to control aphids. On March 2, 2017, 12 lb A⁻¹ 15.5-0-0 (calcium nitrate) fertilizer was injected through the drip irrigation system. On March 14-16, 2017 overhead irrigation was applied for freeze protection. Rye was terminated on March 22 with 2.1 oz A⁻¹ clethodim applied between rows with a backpack sprayer.

Rhubarb was harvested three times on April 14, April 28, and between May 12 and 19, 2017. Petioles were removed by pulling from the crown. Only petioles that were a minimum of 8" long and 0.5" wide were harvested, and no more than 40% leaves and petioles were removed from a given plant at each harvest. Leaves were cut off and petioles were graded into USDA No. 1 Fancy size (10" length and 0.75" width; hereafter '10") or a smaller but marketable size of 8-10" long and at least 0.5" wide (hereafter '8-10"). A sub-sample of petioles was taken from the first harvest to the Plants for Human Health Institute (Department of Horticultural Science, NC State University, Kannapolis, NC) for post-harvest physiology analysis. Petioles were rated for decay and limberness after 14 days in cold storage (39 F, 85% relative humidity), for the effect of cutting versus pulling as a harvest practice, and for average size and color of petioles by treatment.

Rhubarb transplants were given to cooperating farms that also grow annual strawberries in Cabarrus, Caldwell, Catawba, Iredell, Rowan, and Wilkes Counties, identified by N.C. Cooperative Extension Agents in the respective counties.. Each farm applied pre-plant fertilizer according to soil test recommendations. All farms utilized plastic mulch or woven landscape fabric for weed control with 2' in-row spacing. Farms noted and managed any pest-or nutrient-related issues. Rhubarb was harvested on participating farms during the respective strawberry harvest in spring 2017. Farms recorded final plant counts, petiole weight totals, and price lb⁻¹ received.



Rhubarb was started from seed, and grown in a greenhouse before being transplanted into 4 different colors of plastic and one bare ground treatment at the NCDA and CS Piedmont Research Station, Salisbury, NC.

Literature Cited

¹Bratsch, A. and D. Mainville. 2009. Specialty Crop Profile: Rhubarb. Virginia Cooperative Extension Publication 438-110. ²Cantaluppi, C.J. 2014. Growing Rhubarb as an Annual Crop in North Carolina. Unpublished.

Annual Rhubarb Production as an Alternative Enterprise for Farms in the North Carolina Piedmont

Objective



Results

- Transplant losses occurred where overwatering or water-logged soils followed transplanting.
- Rhubarb grown on bare ground or on silver plastic had the highest incidence of red coloring in petioles.

- those starting at \$4 lb⁻¹ reporting increasing their price to \$5 lb⁻¹ without losing sales.
- damage was observed during the harvests that coincided with strawberry harvest.
- 60% of growers who participated in 2016-2017 are participating, along with 2 new farms, in 2017-2018.





Left: Rhubarb curculio observed on rhubarb. Above: Damage from rhubarb curculio on petiole.

Conclusions

- analyze average production costs to determine potential net returns.

Table 1. Number of surviving plants, total yield of rhubarb petioles grown on 4 diffe bare ground treatment. Rhubarb was har at the NCDA & CS^a Piedmont Research

				ł	narvested per
Treatment	# plants ^b	10" ^c	8-10" ^d	Total	plant
		Ibs Harve	ested ^e		
Black Plastic	82	131	33	164	2.0
Red Plastic	91	89	46	135	1.5
Silver Plastic	63	108	43	151	2.4
While Plastic	71	59	19	78	1.1
Bare Ground	82	42	29	71	0.9
^a North Carolina	a Department o	of Agricultu	ire and Cor	nsumer Ser	vices.
^b Per 190' of rov	N.				
°Petioles >10"	long and 0 75"	wide.			

relivies ~ 10 iony and 0.75 wide.

^dPetioles 8-10" long and >0.5" wide.

^eTotal over three harvests.

• Rhubarb transplanted at the same time as strawberry crowns were ready to harvest during the strawberry ripening at the Piedmont Research Station and on all cooperating farms.

• 70% of rhubarb harvested met USDA No.1 and No.1 Fancy length standards but most were predominately green in color and width was variable.

• Rhubarb grown on silver and red plastic had the largest petioles by weight. Red and black plastic had the highest yields, though not statistically significant. • After 14 days in cold storage, rhubarb grown on white plastic had the highest percentage of limber petioles (60%). Black (40%), red (35%), and silver (35%) were lower but similar, and rhubarb grown on bare grown had the lowest level of limber petioles (17%). Weight loss was <0.5% per petiole and only one petiole demonstrated decay after 14 days. • Reporting on-farm trials recorded yields of 1-2 lb plant⁻¹. The farm with the lowest per plant yield detected a manganese deficiency November 2016, which was corrected in spring 2017. • Cooperating farms were able to sell all harvested rhubarb at farmers markets, farm stands, and through local wholesale accounts. Farms reported charging \$4-6 lb⁻¹ for rhubarb, with

• At the end of the season, rhubarb curculio (Lixus concavus) had damaged petioles at the Piedmont Research Station, leaving them unsuitable for wholesale markets. However, little





Master GardenerSM Volunteers assist with rhubarb grading and harvest.

• There is strong market demand for locally-grown rhubarb in the NC piedmont and mountains, and farms can expect to receive \$5-6 lb⁻¹ for rhubarb sold to direct markets. • Due to lack of red color in petioles, 'Victoria' rhubarb grown in the NC piedmont is unlikely to meet USDA No.1 standards and will therefore not be suitable for wholesale shipping markets. Other varieties may supply better red color; however heat-tolerance, yields, and harvest timing needs to be tested in these varieties. • A second year of research is underway to further assess yield and quality differences between rhubarb grown on different colors of plastic. • Insect and disease pests observed in fall 2016 varied between sites. Future research should assess the economic importance of managing these pests. • Over 598 lb rhubarb was harvested at the Piedmont Research Station from 0.11 acre. At \$5 lb⁻¹ this represents \$2990 gross income. A future component to this study will be to



I yields, and average per plant
erent colors of plastic mulch and a
rvested at 3 dates in spring 2017
Station, Salisbury, NC.



Average lb

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