Research Reports

Black Plastic Mulch and Between-row Cultivation Increase Black Currant Yields

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ADDITIONAL INDEX WORDS. *Ribes nigrum, Festuca rubra*

SUMMARY. Black currant (*Ribes nigrum* L.) plants of eight varieties were grown either through black plastic mulch or in bare soil and with the area between the rows cultivated or sodded with red fescue (*Festuca rubra* L.). Over 6 years, black plastic mulch increased yields by 26% over no mulch and cultivation between the rows increased yield by 32% compared to sod. The effect of both treatments was additive, cultivation and black plastic increased yield by 68% over grass and no black plastic. Growers are recommended to plant black currants through black plastic and avoid using sod between the rows.

Black currants (*Ribes nigrum*) are widely grown in Europe, but are not a commercial crop in North America (Barney, 1996; Dale, 1992). However, with the development of powdery mildew [*Spaerotheca mors-uvae* (Schwein.) Berk. & Curt.] and white pine blister rust (*Cronartium ribicola* J.C. Fisch.)-resistant varieties in Europe, growers in North America are more interested in planting them.

Black plastic is used commonly in Europe at planting because it helps maintain soil structure and moisture and almost completely eliminates weeds and the plants yield more (Guiheneuf, 1988; T. Sobey, personal communication). Although increased black vine weevil (*Otiorhynchus sulcatus* Fabricus) populations in the soils under black plastic damaged black currant plants in parts of England (R. Brennan, personal communication, T. Sobey, personal communication). North American growers often plant grasses between the rows of various small fruits to control erosion and to make the fields more pleasant to pick in when the fruit is handpicked. This practice can reduce yield in raspberries (*Rubus idaeus* L.) (Sanderson and Cutcliffe, 1988), but in highbush blueberries (*Vaccinium corymbosum* L.) between-row grasses only reduced yields when plants were stressed by low levels of supplementary irrigation (Dale et al., 1989).

Most of the black currant plantings where black plastic is used are in northwestern Europe, where weather patterns are less variable due to the maritime climate. Hence, this experiment was designed to investigate how black plastic affected yields in a more continental climate of southwestern Ontario. Also, it was decided to test whether grass planted between the rows influenced the black plastic culture.

Materials and methods

Eight black currant varieties (Baldwin, Ben Lomond, Ben Nevis, Ben More, Ben Sarek, Polar, Topsy, and B73013-39) were planted in a Fox sandy loam soil at the Horticultural Research Institute of Ontario, Simcoe, Ontario, on 23 Apr. 1987. Because the plant supply was limited, both 1- and 2-year-old plants were used. All plants of a single variety within a replicate were of the same age, so that age effects were confounded with block effects. Two soil management factors were used. Plants were either planted through black plastic mulch [polyethylene, 6 mil thick (0.15 mm, 0.006 inches)] 0.6 m (2 ft) wide or planted directly into the soil. The soil between the rows was either sown with red fescue or cultivated annually in the spring.

All plants were trickle-irrigated with 3.8 L (1 gal) of water per plant daily during the growing season and fertilized according to standard Ontario recommendations (Ontario Ministry of Agriculture and Food, 1987). Nonmulched plots were sprayed annually before budburst in the spring with a mixture of paraquat and simazine to control broad-leaved weeds and grasses. Pest control chemicals were not used except for one treatment of diazinon once in 1988 to control currant sawfly (*Nematus ribesii* Scop.). The red fescue was mowed regularly during the growing season and 2-4D was applied once each fall to control broadleaf weeds.

The experimental layout was a randomized split-split plot design with five replications of between-row treatments as main plots, between-plant mulch as subplots and varieties as sub-subplots. Each subplot consisted of a single row of 10 plants, 2.7 m (9 ft) between rows, and 1.2 m (4 ft) within rows, one plant of each variety and one guard plant at either end.

From 1988 to 1993, all the ripe fruit were removed from each plant at a single harvest, and weighed. A sample of 100 fruit was also weighed and used to calculate the average berry weight. In 1991, the height and diameter of each bush, parallel and perpendicular to the row direction, were measured. These dimensions multiplied together, provided an estimated plant volume.

Data were analyzed by analysis of variance annually. At the end of the

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Table 1. Total yield of black currants grown with different between-row management treatments, 1988 to 1993 (28.35 g = 1.0 oz).

	Yield (g/plant)						
Treatment	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**Avg**
Cultivated	288	760	842	1124	453	899	728
Grass	247	527	683	800	369	669	551
P	0.25	0	0.24	0	0.094	0.035	0.01

experiment, the data were analyzed to take account of the variation between the 6 years of harvest. The year affect was analyzed as the third level in a split-split-split plot design.

Results and discussion.

For yield, the mulch, between-row management, variety and year effects all varied significantly. Only the year × variety, year × between-row management interactions varied significantly. For average berry weight no effects or interactions varied significantly. The 6-year average yield was 26% higher where black plastic mulch was used [712 g (25.1 oz) per plant] compared to no mulch [565 g (19.9 oz) per plant]. Annual cultivation between the rows increased the 6-year yield on average by 32% compared to sod, but this increase was only significant in 3 years out of 6 (Table 1).

The volume of the bushes in 1991 only varied significantly for between-row management and varieties. The estimated volume was 0.95 m^3 (33.5 ft^3) and 0.66 m^3 (23.3 ft^3) for cultivated and grass treatments respectively ($P = 0.018$).

Black plastic mulch and between-row cultivation increased yields of black currants over a 6-year period compared to no mulch and sod. The effect of both treatments was additive so that the highest yields were obtained when both black plastic mulch and between-row cultivation were used as treatments (black plastic mulch and between-row cultivation out-yielded no mulch and grass by 68%).

The increased yields from black plastic mulch confirmed results obtained in Europe (Guiheneuf, 1988) and shows that this technology can benefit growers in North America. In Europe, black plastic mulch reduced soil water loss (Larrson and Jensen, 1996) and this was probably one factor that led to the increased yields found in this experiment.

The reduced yields obtained when red fescue was planted between the rows suggests that ground cover plants compete with the currant crop for available resources (Hogue and Neilsen, 1987).

This experiment confirms previous work. Growers would benefit from planting black currants through black plastic and should avoid using ground covers between rows.

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