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MULCHING EFFECTS ON SOIL TEMPERATURE, WEED CONTROL, GROWTH, AND SURVIVAL OF ROSE VARIETIES

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Summary

Mulching Peace, Double Delight, Queen Elizabeth, and Tropicana rose varieties with rockwool, pine straw, and sawdust resulted in lower soil temperatures under the various mulch treatments than under bare soil. Queen Elizabeth was the most vigorously growing variety. The Peace variety had the lowest survival rate after 2 years' growth. There was little difference in the growth of rose bushes under the various mulch treatments. The understock used on the four rose varieties may have influenced both their growth and survival rate. Sawdust controlled weeds better than the rockwool or pine straw mulch treatments.

Introduction

Many homeowners who purchase rose bushes are interested in mulching or covering the soil in their rose plantings with some protecting material to conserve moisture, to control weeds, and to protect plants from winter injury.

The \$10-million rose industry of East Texas occurs within a 50-mile radius of the Texas A&M University Agricultural Research and Extension Center at Overton. Approximately 120 growers in Smith, Van Zandt, and Cherokee Counties produce and market over 12 million plants during a normal growing season. In addition, it is estimated that the sale of cut rose blooms adds at least another \$100,000 to the income of this area. The Texas rose industry accounts for about half the rose bushes sold in the United States with additional shipments to Canada, Mexico, and overseas.

The objective of this research was to observe the effects of various mulch treatments on soil temperature, weed control, growth, and survival of four rose varieties.

Materials and Methods

Mulch treatments consisted of rockwool, pine straw, and sawdust applied to a depth of approximately 5 inches plus a non-treated control treatment to evaluate

the effect of mulching on Peace, Double Delight, Queen Elizabeth, and Tropicana rose varieties.

Five inches of shingletow (partially rotted wood shavings) were applied in January on six beds 12 feet apart and incorporated into the soil before placing eight plants each of the above four varieties in the four mulch treatments.

Copper constantan thermocouples were inserted to a depth of 1 and 3 inches under each of the four mulch treatments. Temperatures were recorded with a 24-point recording potentiometer every 2 hours each day from July through December. Recommended spray, trickle irrigation, and fertilizer practices were observed throughout the growing season.

The weight of wood from 128 rose bushes of Peace, Double Delight, Queen Elizabeth, and Tropicana varieties, pruned to a height of 12 inches in mid-February 1978 and 6 inches in February 1979, was used as a measure of growth.

Results

Soil temperature - All mulching materials significantly reduced soil temperature, compared to the untreated control (bare ground). The major difference in soil temperature was most apparent between 11 a.m. and midnight as heat accumulated during the day and was released at night. Mulches provided about a 5-degree advantage over bare soil (Figure 1). The mulch treatments kept the soil cooler in July and warmer in October and November (Figure 2, Table 1).

Variety growth - Queen Elizabeth was the most vigorously growing cultivar in the experiment, followed by Peace, Double Delight, and Tropicana (Table 2). There was a significant difference in the growth of the four rose varieties in 1977 and 1978. The Tropicana variety had less growth in 1977 than the Peace variety. In 1978, both Peace and Tropicana had the same vigor (Table 2). This difference may have been due to the use of inferior understock on the Peace variety. The four rose varieties had less growth in the rockwool treatment than in the control, pine straw, or sawdust mulch treatments. There was no statistical difference in growth between the control and the pine straw and sawdust treatments (Table 3).

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KEYWORDS: soil temperature/mulch/rose bushes/*Rosa multiflora*/*Rosa odorata*/weed control.

Weed control - The sawdust mulch controlled weeds in the bed better than rockwool and pine straw (Table 4). Rockwool gave superior weed control to pine straw. There was less weed growth under the pine straw mulch than on the non-mulched plots.

Rose bush survival - After 2 years, the percent survival of rose bushes was 97 for the Queen Elizabeth, 87 for the Double Delight, 89 for the Tropicana, and 65 for the Peace variety (Table 5). Percent survival rate under the various treatments was 95 for sawdust, 88 for the control, 80 for pine straw, and 74 for rockwool mulch.

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Table 1. Effect of mulch treatment and month on soil temperature under various mulch materials

Treatment	Month			Avg.
	July	October	November	
Control	83 ^a	65	56	68 (20.0) ^{bD}
Rockwool	75	59	56	63 (17.2) B
Pine straw	77	58	53	62 (16.7) A*
Sawdust	79	58	56	64 (17.8) C
Avg.	79 (26.1)A*	60 (15.6)B	55 (12.8)C	

^aF₀

^bC₀

*Numbers followed by the same letter are not different at the 1% level according to Duncan's new multiple range test.

Table 2. Influence of year and variety on the growth of four rose varieties at Overton, Texas

<u>Year</u>	<u>Lbs of tops/8 bushes</u>				<u>Avg.</u>
	<u>Peace</u>	<u>Double Delight</u>	<u>Queen Elizabeth</u>	<u>Tropicana</u>	
1977	4	3	5	3	4 B
1978	5	5	10	5	6 A
Avg.	4 B	4 B	8 A*	4 B	

*Numbers followed by the same letter are not different at the 1% level according to Duncan's new multiple range test.

Table 3. Effects of mulching material on the growth of four rose varieties at Overton, Texas

<u>Mulch</u>	<u>Lbs of tops/8 bushes</u>				<u>Avg.</u>
	<u>Peace</u>	<u>Double Delight</u>	<u>Queen Elizabeth</u>	<u>Tropicana</u>	
Control	5	4	8	5	6
Rockwool	3	3	6	3	4
Pine straw	4	5	9	4	6
Sawdust	5	4	7	4	5
Avg.	4 B	4 B	8 A	4 B	

*Numbers followed by the same letter are not different at the 1% level according to Duncan's new multiple range test.

Table 4. Effect of mulch treatment on weed growth in roses

<u>Treatment</u>	<u>Weed Control*</u>
Control	2 D
Rockwool	7 B
Pine straw	4 C
Sawdust	9 A**

* 1 = poor

10 = good

** Numbers followed by the same letter are not different at the 1% level according to Duncan's new multiple range test.

Table 5. Effects of mulch and variety on the survival of rose bushes at Overton, 1979.

<u>Mulch Treatment</u>	<u>Percent Survival</u>				<u>Avg.</u>
	<u>Peace</u>	<u>Double Delight</u>	<u>Queen Elizabeth</u>	<u>Tropicana</u>	
Control	72	88	100	94	88
Rockwool	44	75	97	81	74
Pine straw	53	84	100	81	80
Sawdust	91	100	91	100	95
Avg.	65 B	87 A*	97 A	89 A	

* Numbers followed by the same letter are not different at the 1% level according to Duncan's new multiple range test.

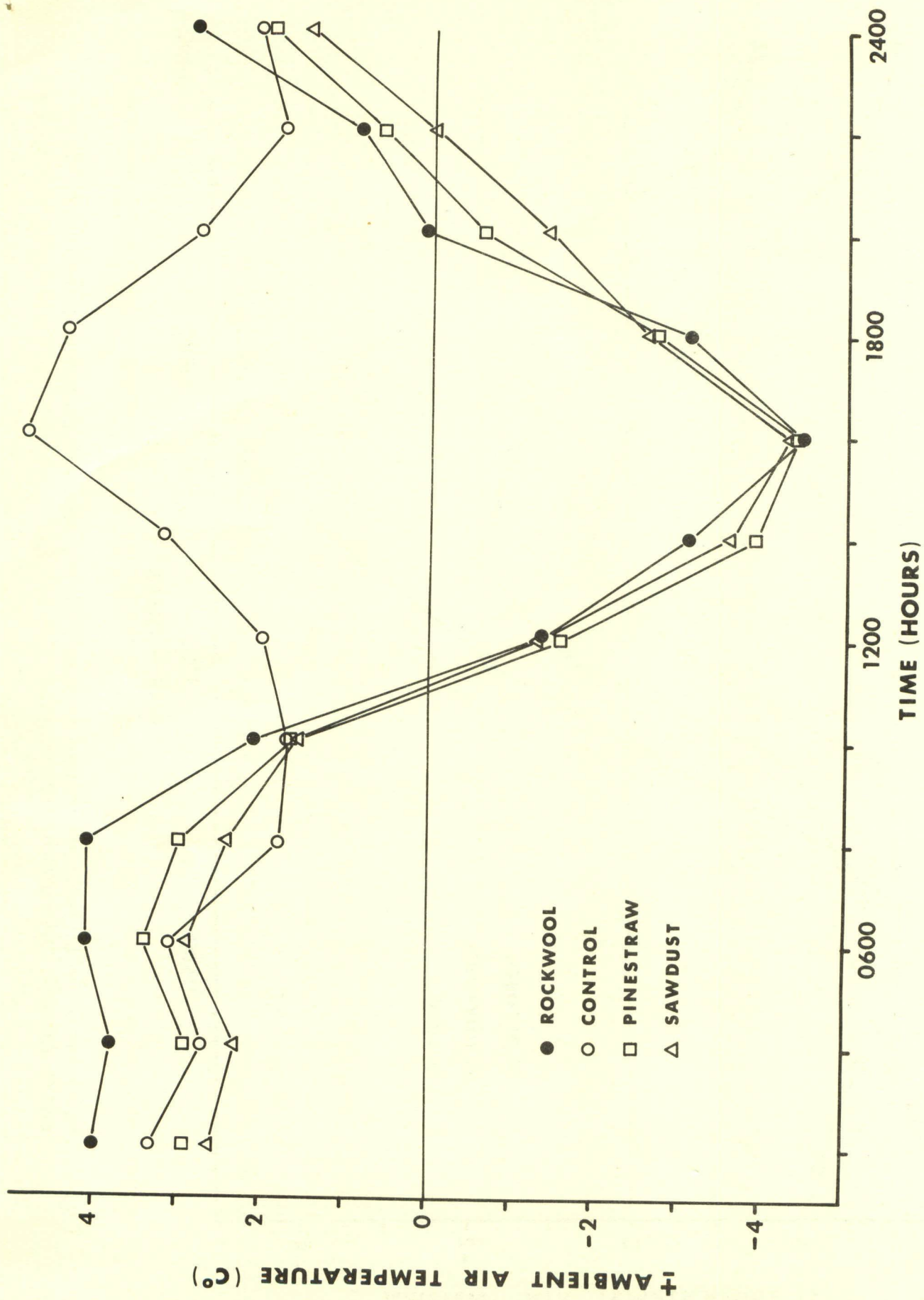


Fig. 1. Daily variation of soil temperature under various mulch treatments in relation to ambient air temperature.

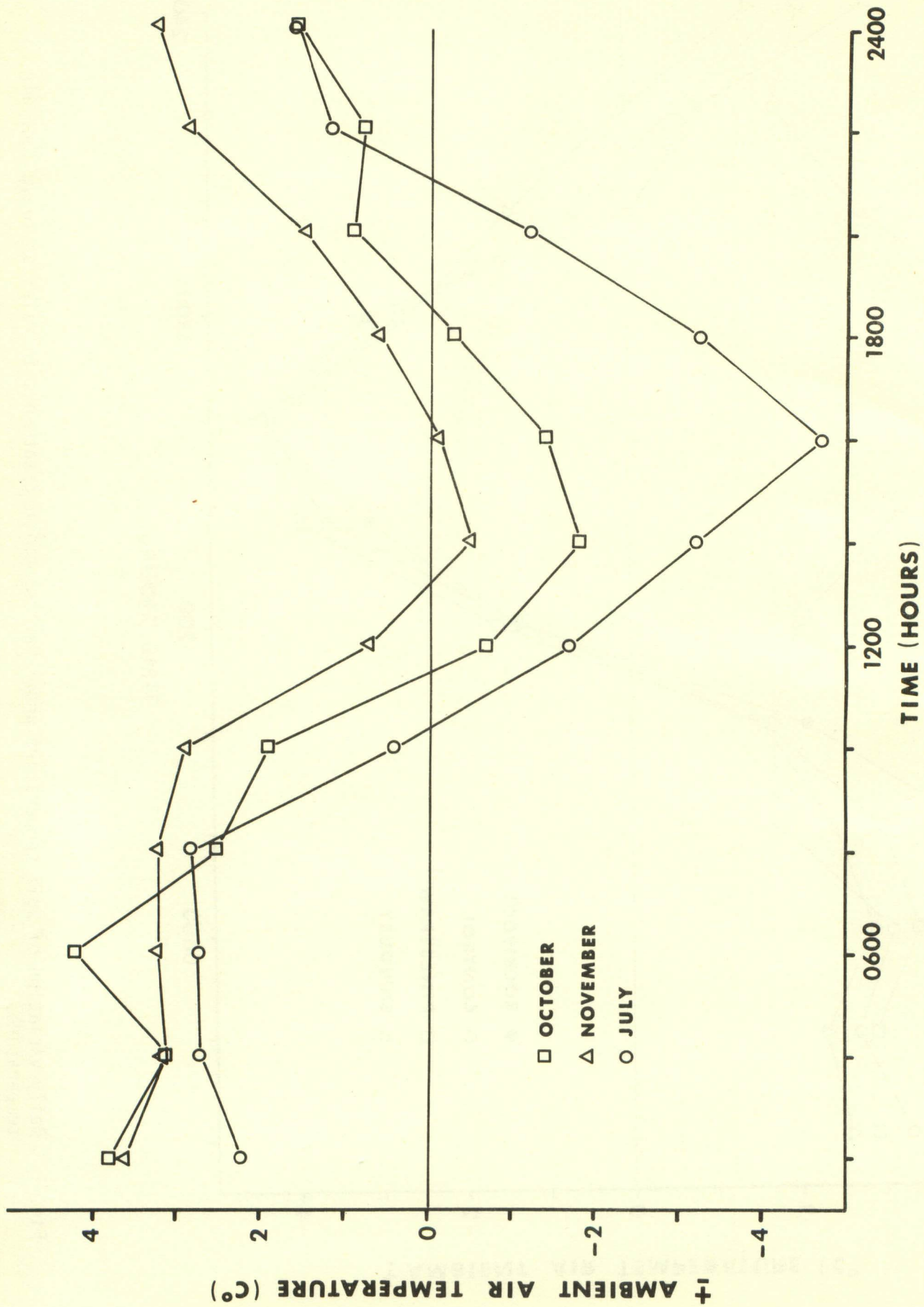


Fig. 2. Daily variation of soil temperature from ambient air temperature during three months of the summer and fall rose growing season.