SOME OBSERVATIONS ON ALTITUDINAL TOLERANCE OF MULTIFLORA ROSE

REX L. BIRD, North Carolina Wildlife Resources Commission, Raleigh, North Carolina

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There has been a good deal of discussion and little investigation on the ability of multiflora rose to tolerate and flourish at various altitudes. The State of North Carolina provides a unique opportunity to make some comparisons as it can furnish testing plots from sea level to over 5000 feet above sea level with accompanying changes in the temperature. Although far from complete, such a study has been started, and preliminary indications are that valuable data can be derived from it.

The intended purposes of this study are to determine the approximate altitude at which multiflora rose would make enough growth to give gratifying results to the landowner who did the planting, and to give the wildlife manager information upon which to base future recommendations; secondly, to determine the limit in elevation at which multiflora rose will grow in western North Carolina, and thereby judge more accurately the merits of planting requests, especially for those many small heavly-wooded farms at the higher altitudes.

METHODS

The test plantings of multiflora rose, with which this study is concerned, are located on the 5400-acre, Coweeta Hydrologic Laboratory property of the U. S. Forest Service about 90 miles southwest of Asheville, North Carolina (Fig. 1).

It was thought best to use this government land for the test areas as the plantings would remain undisturbed and protected, and various data and information could be collected for several years, if necessary. Furthermore, the area is fairly typical of the western mountainous sections of North Carolina and the hardwood forest within the area is typical of much of the eastern United States.

The friable clay loam soils of the area are characterized by those conditions that allow them to absorb a large amount of moisture. These soils are naturally productive and have not been leached or oxidized to so great an extent as the red soils of the valleys.

Moderate temperatures and abundant rainfall characterize the modified continental climate of the area where these plantings were made, except that the summers are cooler and the rainfall is greater than is usual in the interior states. The mean annual temperature is 55°F and the average frostfree growing season of 189 days extends from April 17 to October 23 (the average last spring and first fall frost dates). During the growing season the temperature average 65°. Temperatures above 90° are rare and summer nights are cool, with minimum temperatures averaging 58°. The average temperature for December, January and February is 39° and periods of cold weather with temperatures less than 20° are short in duration, rarely going to zero, except during rather unusual cold periods.

The average annual rainfall of 77 inches is well distributed throughout the year and during the summer and fall there is usually considerable fog.

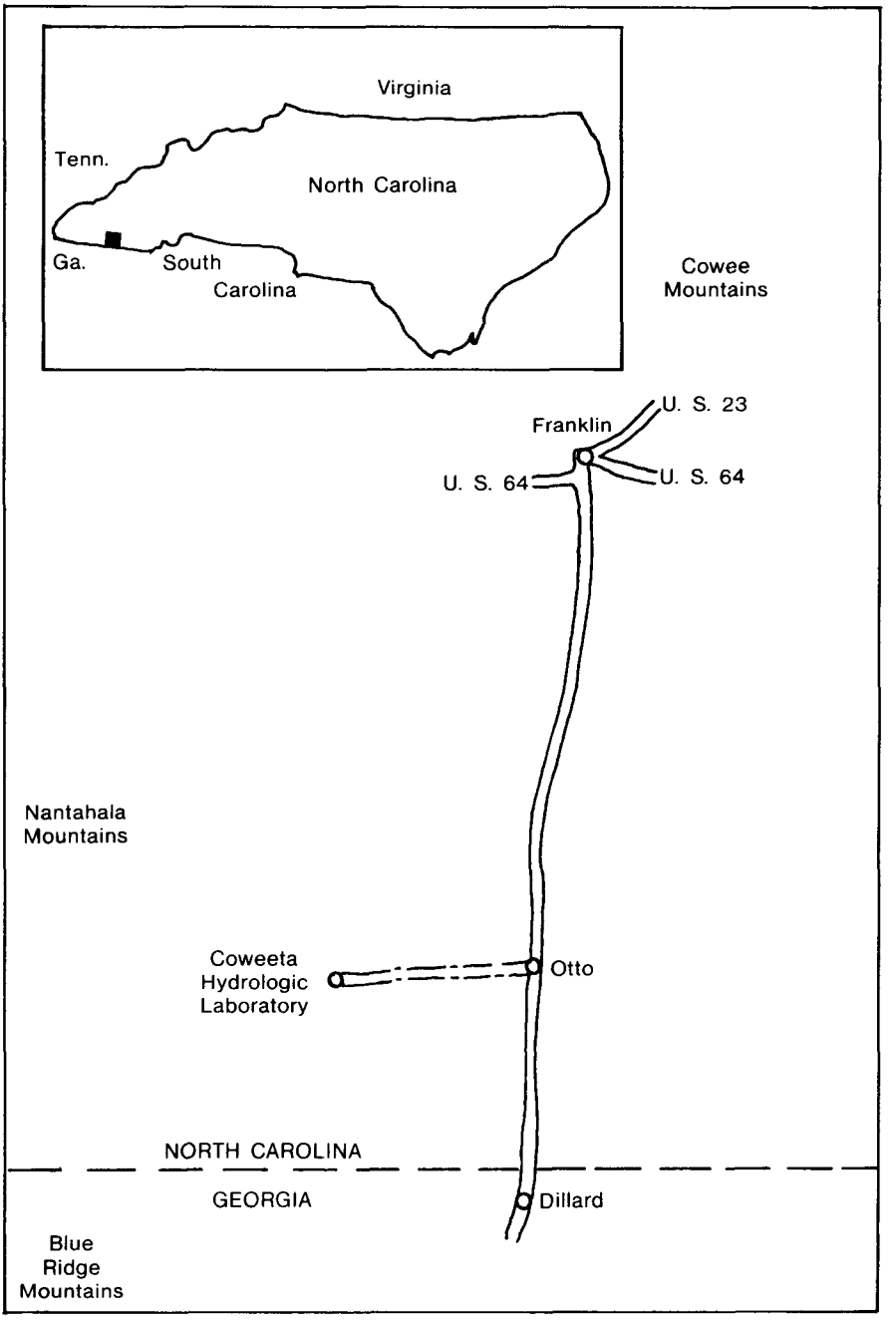

Fig. 1. Location of test area.

RESULTS

The plantings were made in 1950 and inspections were conducted during the late spring of 1951, 1952, and 1953. The majority of the plantings are located in semi-shaded sites where they are exposed to less than half of the day's sunlight. In spite of this however, there was a very high survival rate which indicated that proper planting methods were used. Nearly all of the plants inspected showed good rich green color indicative of good soil fertility.

The data indicate a gradual increase in average cane length with the rise in elevation from the 3000 to the 4500-foot level. Since the amount of shading at most of these different elevations is approximately the same, sunlight can be eliminated as a variable. The effect of full sunlight is indicated in the third and fourth entries in Table 1 and Figure 2. From Fig. 2 it would appear that optimum conditions of growth occur at the 2500-foot elevation. Actually this impression is misleading in that these two plantings received nearly double the amount of sunlight that the other plantings received. (Table 1). Presumably there would be correspondingly better growth at all elevations in full sunlight.

Table 1. Multiflora rose test plantings at the coweeta hydrologic station.

Elevation in feet	Percent sunglight received[a]	Color	Average height 1951	Average height 1953	Competition
2,250	55	medium green	1'6"	2' 6"	some
2,350	35	dark green	2'	2'10"	little
2,422	70	dark green	2'3"	5'	some
2,500	80	dark green	2'	6'	much
2,950	40	dark green	2'	3'	some
3,500	40	dark green	1'5"	1' 9"	some
4,000	35	dark green	1'2"	11"	much
4,500	40	dark green	6"	5"	much

[a] The daily amount of sunlight received was approximated, taking into consideration the overstory and location of the plants. The "sunlight received" figure in the above table represents the percentage of the total daily sunlight which the plants received.

From the 3000 to the 4500-foot level the only variable in growing conditions appears to be air temperature. The differences in temperature at the various elevations shown in Table 2 are taken from the Coweeta Station weather charts.

You will note that there is a difference of 2.2° in temperature between Weather Station 1 (2500 feet) and Weather Station 4a (3250 feet) with a difference in elevation of 750 feet; and a difference of 3.5° in temperature between Weather Station 4a and Weather Station 14 (4400 feet) with a difference in elevation of 1150 feet.

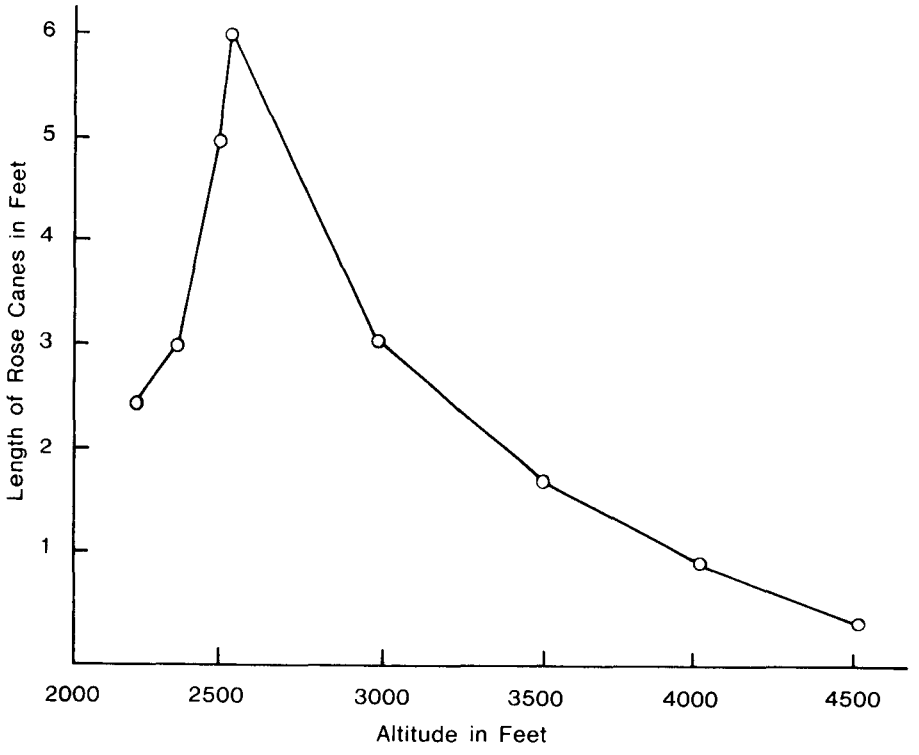

Fig. 2. Average length of multiflora rose canes at the end of third growing season.

Table 2. Air temperature summary.

Weather Station	Duration	Elevation in feet	Temperature (F) Monthly average	Average drop between stations
1	1935-1951	2,500	55.3°	
				2.2°
4a	1943-1951	3,250	53.1°	
				3.5°
14	1943-1951	4,400	49.6°	

CONCLUSIONS

Although multiflora rose shows good growth and development at elevations up to about 3000 feet, there is a marked dimunition of vigor at higher elevations. The precise height limit for effective use of multiflora has not yet been determined. Indications are, however, that the value of multiflora rose for wildlife management purposes is doubtful at elevations over 3000 feet unless care is taken to provide a good site and proper culture. Since most of these plots are located in semi-shade, and were not fertilized or cultivated, it is reasonable to expect better development at these higher elevations (at this latitude) in full sunlight with proper culture.

SUMMARY

This study was undertaken to determine the altitudinal tolerance of multiflora rose on a test area that would remain undisturbed and useful for future reference. Information by which to guide future planting recommendations can be gathered from the observations of these plantings at various altitudes.

The area selected for the test plantings is fairly typical of the western mountainous sections of North Carolina and the hardwood forest on the area is typical of much of the eastern United States, therefore, the findings revealed here might be applicable to other comparable situations.

The naturally well-drained loamy soils of the area are materially productive. Moderate temperatures and abundant rainfall characterize the modified continental climate of the area.

Fifteen hundred rose seedlings were planted on March 31, 1950 in eight plots, at similar sites, at altitudes ranging from a low of 2250 feet to a high of 4500 feet. The seedlings were planted by the hole method and none of these plants were fertilized, cultivated or pruned and have competed moderately successfully with weed competition.

Inspections were made during the late spring of 1951, 1952 and 1953. Survival rate was high and plant color was good even though most of the plantings were located in semi-shaded sites exposed to less than half of the day's sunlight.

The data at hand indicate that although multiflora rose will survive at elevations up to 4500 feet, there is progressive decrease in growth above 3000 feet elevation. It is therefore doubtful that multiflora will make sufficient growth to establish proper food and cover for game or a fence for livestock. The elevations to which it can be used above 3000 feet may be extended by proper culture and location in full sunlight.