

**OREGON
ORNAMENTAL AND
NURSERY DIGEST**

**November 1969
Vol. 13, Issue 2
Pages 1-3**

**C. R. Johnson
A.N. Roberts
Department of Horticulture
Oregon State University
Corvallis, OR**

DEFICIENCY SYMPTOMS OF RHODODENDRON STUDIED

Rhododendron leaves often show chlorosis. However, diagnosis of causes have been difficult because the literature lacks descriptive symptomatology. Various nutrient deficiency symptoms were developed in Rhododendron 'Cynthia' and 'Pink Pearl' to supply this information. Rooted cuttings were grown in sand cultures containing complete Hoagland's solutions (Nos. 1 and 2), or minus one of the following from Hoagland's No.1: nitrogen, potassium, phosphorus, magnesium, sulfur, calcium, iron, boron, or manganese.

Deficiency symptoms were produced on plants from the various nutrient cultures in a three- to nine-month period and are discussed in the order of their appearance. Leaf symptoms and composition values were similar for both cultivars: therefore, the results presented are applicable to both 'Cynthia' and 'Pink Pearl.'

Leaves from plants receiving the nitrate form of nitrogen (complete Hoagland's No. 1) were smaller and had slight interveinal chlorosis compared to those receiving the ammonium form (complete Hoagland's No. 2). Thus, as found by Colgrove with azaleas, the ammonium form of nitrogen also produces healthier appearing foliage in rhododendron.

Nitrogen malnutrition visible

Nitrogen malnutrition was visible three months after planting, and the plants were stunted in growth. All the leaves were uniformly light green in color and dwarfed. Phosphorous-deficient plants were stunted and had leaves that were smaller and darker green in color than normal. The tips of such leaves became necrotic, and this condition spread over the entire surface causing premature defoliation. Stunted and contorted multiple shoots developed at the apex of shoots deficient in boron. The stunted leaves also showed marginal yellowing and tip scorching. Calcium deficiency was observed after five to six months, although the new shoot growth was visibly stunted about two to three months earlier. The tips of calcium-deficient leaves became scorched and shriveled, with the basal portion remaining dark green.

There were no significant reductions in growth with other nutrient-deficient cultures. Iron deficiency was apparent four to five months after planting. Young leaves were initially pale yellow, but older ones developed distinct interveinal chlorosis and the whole plant eventually became chlorotic. Severe interveinal yellowing developed in the centers of leaves deficient in magnesium when the plants were about five months old. These areas became necrotic and the leaves dropped prematurely. Potassium deficiency was first evident as an orange mottle along the margins of older leaves that later became necrotic causing premature defoliation. The last

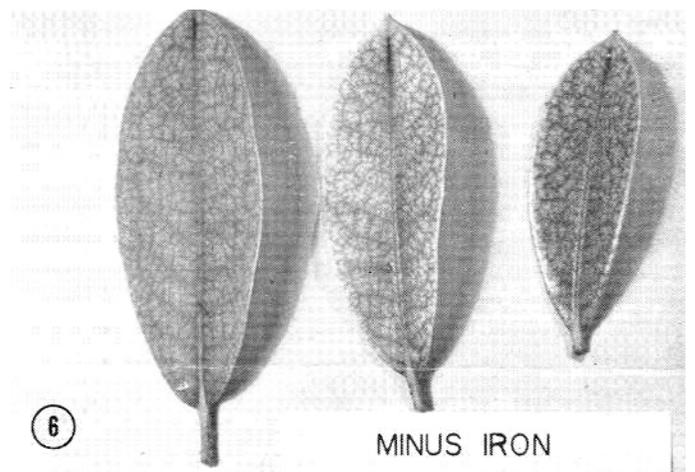
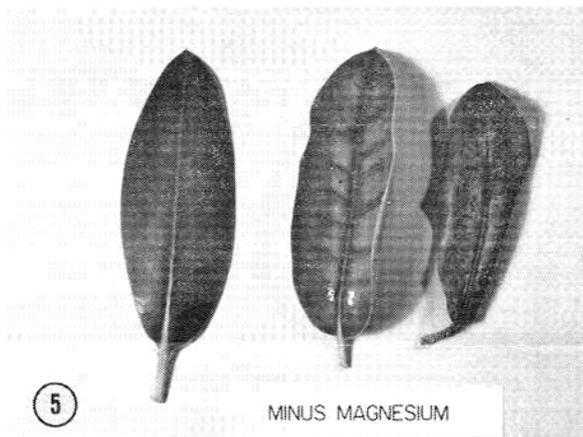
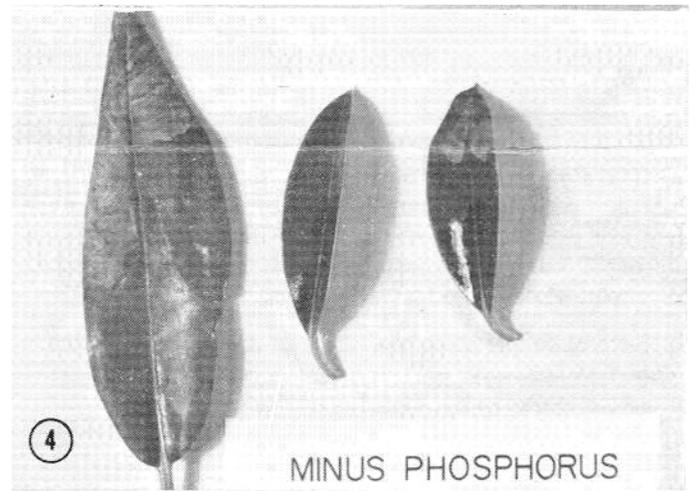
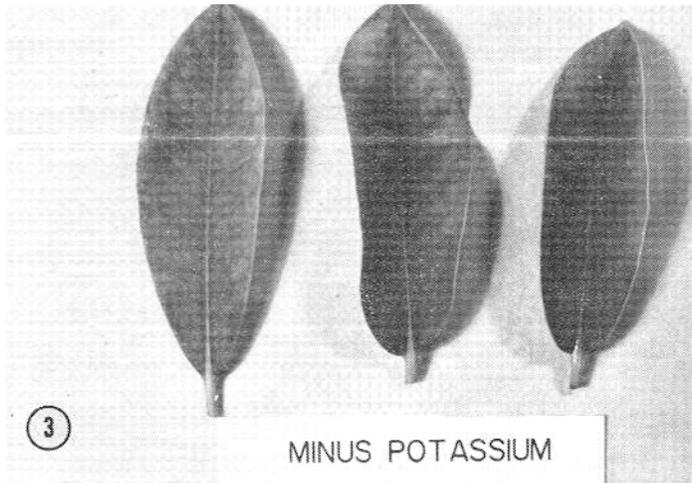
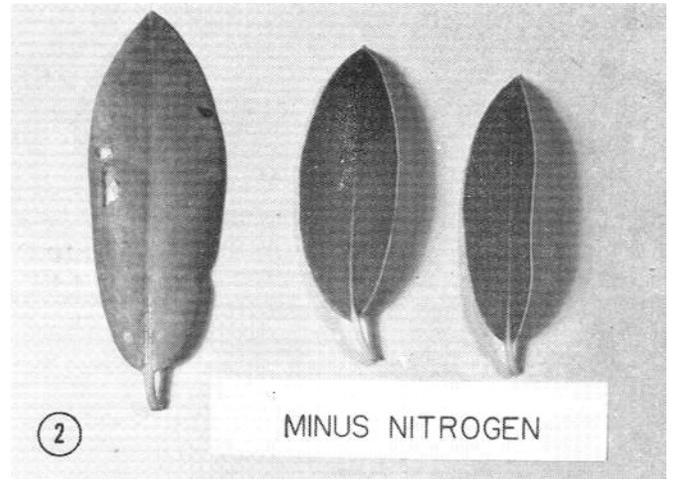
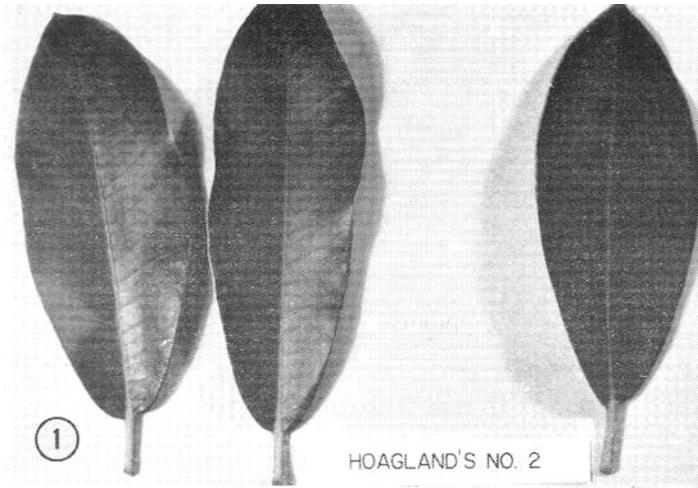
deficiency symptom to develop (9 months) was that of sulfur. After two or three flushes of new growth, the youngest leaves were pale green. All leaves were eventually lighter green than normal, but they developed no other distinct symptoms. Even though the level of manganese in leaf tissue was low compared to other cultures, there was no visible evidence of deficiency. Apparently the rhododendron can continue normal growth on very low levels of this element.

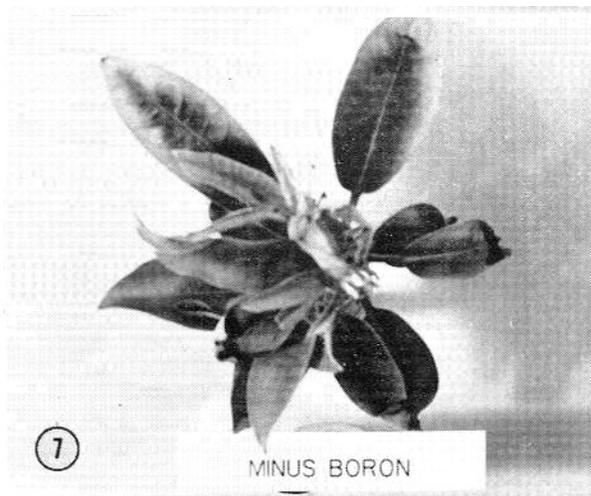
Leaf samples of both cultivars were collected from the plants as the symptoms of nutrient deficiency developed. Leaf analyses were then made to indicate approximate threshold levels of the various elements. The mineral composition values are an average of both cultivars and appear in Table 1. Pictures with brief descriptions of some of the various nutrient-deficiency symptoms appear in the accompanying figure.

Table 1. Mineral composition of Rhododendron 'Cynthia' and 'Pink Pearl' leaves at first visible symptoms of deficiency

<u>Nutrient Solution</u>	N	P	K	CA	MG	B	Mn
		<i>Percent dry weight</i>				<i>ppm</i>	<i>ppm</i>
Complete Hoagland's No. 2	2.65	.346	3.08	.99	.302	45.7	75
Complete Hoagland's No. 1	2.43	.312	2.95	1.10	.292	54.0	70
Minus N ^a -----	1.00	.451	2.72	.86	.212	59.0	108
Minus P -----	2.76	.110	3.40	1.21	.165	86.5	115
Minus K -----	3.12	.465	.30	1.25	.202	77.8	75
Minus Ca -----	2.41	.337	3.13	.14	.293	66.0	51
Minus Mg -----	2.57	.517	3.05	1.32	.039	64.5	58
Minus S -----	2.51	.510	3.89	.89	.269	55.7	77
Minus Fe -----	2.75	.517	3.21	.84	.201	58.2	80
Minus B -----	2.77	.438	3.08	1.18	.212	14.6	59
Minus Mn -----	--	.246	.320	2.20	1.05	.205	49.5

Leaf deficiency symptoms of Rhododendron 'Cynthia' and 'Pink Pearl': 1) **Hoagland's No. 2**—lush growth and dark green colored leaves. 2) **Nitrogen deficiency**—all leaves pale green color. 3) **Potassium deficiency**—orange colored, then necrotic areas along margins of old leaves; premature defoliation. 4) **Phosphorous deficiency**—young leaves dark green with necrotic spots at the tip, eventually spreading over entire surface causing premature defoliation; plant and leaves dwarfed; 5) **Magnesium deficiency**—severe yellowing in the center of all leaves, turning necrotic; premature defoliation. 6) **Iron deficiency**—young leaves pale yellow developing interveinal chlorosis with age; whole plant becomes chlorotic. 7) **Boron deficiency**—leaves stunted and distorted, with marginal yellowing and tip scorching; all growth stunted.





Oregon Ornamental and Nursery Digest was published from 1957 to 1975 by the Agricultural Experiment Station, Oregon State University, Corvallis.

Pesticide Use - Due to constantly changing laws and regulations, no liability for the suggested use of chemicals in this reprint is assumed. Pesticides should be applied according to label directions on the pesticide container.

Permission to Reprint material appearing in the Oregon Ornamental and Nursery Digest is granted with the request that you credit the source: Oregon Ornamental and Nursery Digest, date, volume, issue, page numbers. Do not excerpt or reprint in such a manner as to imply the author's endorsement or criticism of a product or concept.

Nondiscrimination - The information in the Oregon Ornamental and Nursery Digest is provided with the understanding that no discrimination is intended and that listing of commercial products implies no endorsement by the authors. Criticism of products or equipment is neither intended nor implied.