

Table 2. THE INFLUENCE OF GIBBERELIC ACID AND PHOTOPERIOD ON THE GROWTH AND NITROGEN ASSIMILATION OF *Vicia villosa*

Date of harvest	Day length (hr.)	G.A. treatment	Height of plants (cm.)	Branches,		Nodules		Dry weight per plant (mgm.)			N (% dry weight)	Total N (mgm. per plant)
				Number per plant	Number per plant	Number per plant	Dry weight per nodule (mgm.)	Roots	Tops	Total		
Oct. 14	8	None	10.0	9	106	0.28	126	217	343	3.2	11.1	
	8	From 17/9	27.5	8	75	0.33	97	267	364	3.1	11.3	
	16	None	17.0	7.5	56	0.62	157	294	451	3.2	14.4	
Nov. 12	8	None	21.5	23	166	—	300	1025	1325	4.5	59.2	
	8	From 17/9	52.3	20	105	—	349	1388	1737	4.1	71.6	
	16	None	61.8	12	124	—	654	1943	2598	3.8	99.0	
Dec. 9	8	None	40.6	37	—	—	718	2804	3522	3.6	127.2	
	8	From 17/9	75.0	25	—	—	804	4265	5069	3.4	173.6	
	16	None	98.0	12	—	—	1845	5351	7196	2.6	188.1	
	8	From 7/11*	54.3	23	—	—	614	2574	3188	4.0	127.0	
	8-16†	None	54.1	23	—	—	881	2675	3556	3.5	122.7	

Seeds were sown in sand cultures on August 27, 1958.

The plants treated with gibberellic acid (G.A.) were sprayed at weekly intervals with a solution containing 10 p.p.m. acid. The values given are the means of 20-30 plants except where otherwise indicated.

* The values for this treatment are the means of 12 plants.

† Plants transferred from short days to long days on November 7.

not to some specific inhibition of nodulation by gibberellic acid. The effect of gibberellic acid on nitrogen assimilation was beneficial when the chemical was sprayed on plants firmly established in a short photoperiod. When plants were still older, gibberellic acid had little or no effect except on the height of the plants.

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Gallic Acid in *Phycomyces* Sporangiohores

THE discovery of a strong negative phototropism to ultra-violet illumination in *Phycomyces* sporangiohores¹ focuses attention on the presence of ultra-violet-absorbing substances in these organs. Such a substance might function as a primary photosensitive pigment, as a screening pigment, or possibly as both. This report concerns how I have isolated an ultra-violet-absorbing substance from sporangiohores of *Phycomyces blakesleeianus* and shown this substance to be gallic acid (3,4,5-trihydroxy benzoic acid). It is well known that gallic acid is produced by a *Phycomyces* mycelium^{2,3}, and the presence of gallic acid in sporangiohores has been briefly noted by Schröter⁴.

About 2,000 sporangiohores, 4 cm. in length, were separated from the mycelium 4 days after inoculation on potato dextrose agar, and the cell contents was collected by pressing. About 1 ml. of fluid was obtained, which was cleared of large particles by centrifuging at 1,000 times gravity. A 300-fold dilution of a small portion of the supernatant in water had an optical density of 1.6 at 260 m μ (optical path 1 cm.), which would correspond to a gallic acid concentration of about 10 mgm./ml. in the undiluted supernatant.

The remaining supernatant (nearly 1 ml.) was dried on the base line of a chromatogram and

developed in a solvent system of 1 part formic acid, 7 parts isopropanol, and 2 parts water. Then the ultra-violet-absorbing material was located as a dark band under illumination at 254 m μ , and a strip containing this region was cut out and eluted with ethanol. The eluate was evaporated to dryness, resulting in a crystalline residue, which was further purified by recrystallizing from hot water.

These purified crystals were then shown to be identical with known gallic acid with respect to the following properties: melting point, chromatographic mobility in three different solvent systems, electrophoretic mobility, colour reactions with ferric chloride and with potassium periodate, and the ultra-violet absorption spectrum.

The distribution of gallic acid along the length of the sporangiohore was also examined. The method is to freeze the sporangiohore and then crush it carefully on to filter paper. Upon thawing and spraying with ferric chloride solution, a rather uniform blue-black line is formed on the paper where the sporangiohore was crushed, indicating the presence of gallic acid at all points along the sporangiohore. Although the method is not refined, the results rule out the possibility that the gallic acid is concentrated in any highly localized region, such as the narrow region of growth and light sensitivity at the upper end of the sporangiohore.

The rather high concentration of gallic acid found in sporangiohores (10 mgm./ml.) leads to a very marked screening effect in the ultra-violet. A gallic acid concentration of 10 mgm./ml. would produce an attenuation in the light intensity of more than 99 per cent, for light having a wavelength shorter than 290 m μ and traversing the 0.1 mm. thickness of a sporangiohore. Thus a sporangiohore illuminated unilaterally by ultra-violet light would receive a greater intensity on its proximal side than on its distal side. This is the inverse of the situation with visible light and could account for the reversal of phototropism observed in the ultra-violet.

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