

The varied colours of *Verbena*

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The garden *Verbenas* are very popular trailing plants of a perennial habit. They strike root as the shoots trail along the surface of the soil and meet with sufficient moisture. It is then possible to separate the rooted portions of the shoots from the parent and grow them independently. *Verbenas* are very serviceable as ground cover in shrubberies, for hanging baskets, for rockeries, for growing in beds and for pot culture. There are several species or varieties which have received distinctive names, viz., amongst which mentioned *Verbena hybrida*, *Verbena erinoides* and *Verbena peruviana*. The flowers of *Verbena* are produced in great profusion. They stand up well above the foliage in large velvety clusters of elegant shape. *Verbena erinoides* is also known as the Moss *Verbena* as the plants cover the ground completely.

Books on gardening stress the wide range of colours exhibited by the *Verbenas*. In one book, we find illustrations of a cluster of intensely blue flowers of *Verbena hybrida* and of a cluster of brilliant scarlet flowers of *Verbena peruviana*. The author of another book goes so far as to say that "there are very few flowers which can beat the *Verbena hybrida* in the exquisite range of colours, varying from white through blue and rose to purple and dark purplish-blue, with shades of pink and pale yellow". It is evident, therefore, that *Verbenas* would be excellent material to illustrate the relationship between the observed colour and the spectroscopic behaviour of flowers.

Blue *Verbenas* would be of particular interest as they may be expected to display the spectral characteristics of florachrome A. At the time of writing, however, they were not to be seen in Bangalore. A purple species of *Verbena* is however quite common, and when as is frequently the case, it has been planted over an extensive area, the ground covered with the flowers presents the appearance of a carpet of that colour. Though the individual flowers are small, a cluster of them presents a substantial area, and its spectral character may be readily determined by viewing the cluster through a pocket spectroscope. An absorption band covering the yellow region of the spectrum is a striking feature, while the green region is visible and by comparison appears fairly strong. The red and blue regions of the spectrum are seen with apparently undiminished strength. The colouring matter of the purple *Verbena* is readily extracted by immersing the flowers in acetone. A spectrophotometric record obtained with a cell of 1 cm thickness containing the extract is reproduced as figure 1. The record exhibits three peaks of absorption, one of which appears in the yellow region of the spectrum and the other two respectively in the green and the green-blue regions. These spectral characteristics

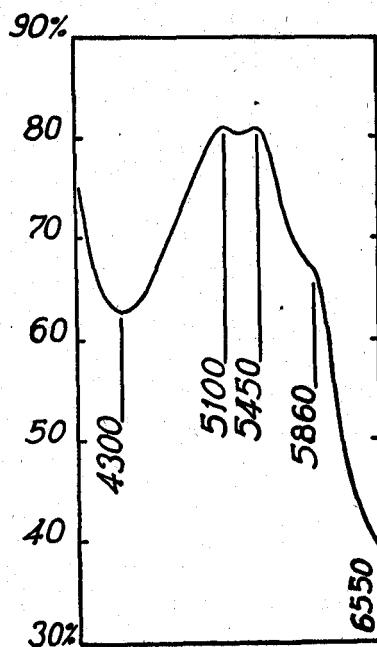


Figure 1. Absorption spectrum of acetone extract from purple *Verbena*.

may be identified as those of florachrome B. The purple *Verbena* furnishes an excellent example of the role that the absorption of the yellow plays in the perception of a purple hue.

In the author's garden at his Institute in Bangalore, a variety of *Verbena* is to be seen, the colour of the flowers of which may be described in general terms as being red. But it is highly variable, varying from a deep purplish-red to quite a pale pink. These differences appear partly to be due to a gradual fading away of the individual flowers, since those nearer the centre of the cluster which are the latest to open have the deepest colour, while the outermost are the palest. Spectroscopic examination of the individual flowers in a cluster reveals that the absorption appearing in the spectral region between 500 and 600 $m\mu$ which is responsible for the observed colour is very weak in the flowers which appear a pale pink, and is almost complete in those which exhibit a brilliant colour. The relative intensity of the absorption appearing in the green sector from 500 to 560 $m\mu$ and in the yellow sector from 560 to 600 $m\mu$ is also highly variable. The observed colour appears to be most saturated when the yellow sector is completely absorbed. This is indeed a general feature in all floral colours.

The spectrophotometer record reproduced above was made in the Instruments Section of the Indian Institute of Science to the authorities of which the author's thanks are due.