

## Floral colours and the physiology of vision— Part IV. The queen of flowers

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(Memoir No. 137 of the Raman Research Institute, Bangalore-6)

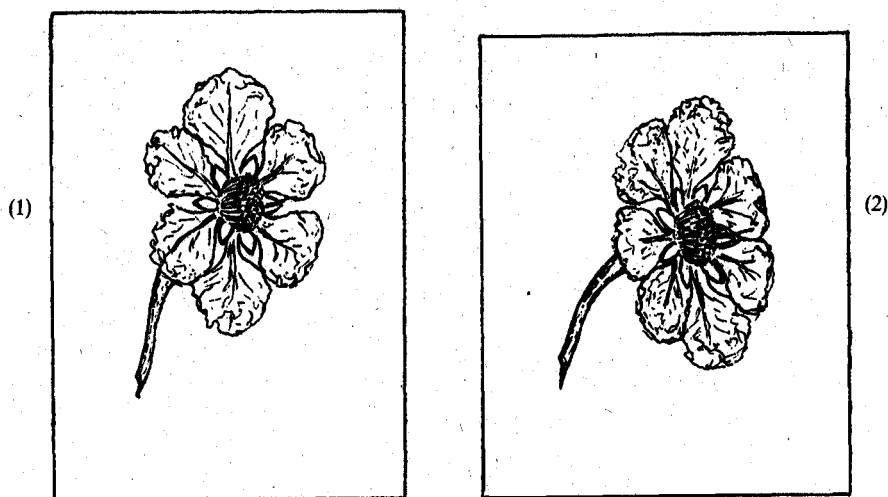
Received June 4, 1963

The forest tree named by the botanist Retzius as *Lagerstroemia Flos Reginae* bears great masses of magnificent flowers in the months of April to July each year and then presents an extremely handsome appearance. For that reason, the tree is sometimes referred to as the Pride of India. It grows to great sizes in appropriate soils and climatic conditions and is valued for the timber of high quality (known locally as Jarul) which it yields. By reason of its beauty when in flower, the tree has been extensively planted as avenues in cities and towns and also in gardens as an ornament. The flowers of *L. Flos Reginae* have been selected for special attention in this part of the memoir for reasons similar to those mentioned in the case of the "Morning Glory".

In the coloured plate illustrating the flowers of *L. Flos Reginae* in the volume entitled *Some Beautiful Indian Trees* published by the Bombay Natural History Society, they are shown as six-petalled and of a bright pink colour. On the other hand, in the plate illustrating D V Cowen's book on *Flowering Trees and Shrubs in India* published by Thacker and Co. of Bombay, they are also shown as six-petalled but of a beautiful purple colour. Actually, there are two distinct species or varieties of the tree, one bearing purple flowers and the other bearing pink flowers. In the gardens of this Institute, trees of both varieties were planted some years ago and their flowers have therefore been available for comparative study. It should be mentioned that occasionally there are seven instead of six petals, as has been mentioned in the works referred to earlier.

The flower-petals are very thin and are crinkled. This is represented in figures 1 and 2 which show the six-petalled and seven-petalled forms respectively reduced to half the natural sizes. Despite the thinness of the flower petals, they do not allow sunlight to penetrate directly through them, but only diffuse it. The spectral composition of the diffused light may be studied either in the forward or in the backward direction, with very similar results. Needless to say, the effects observed with the purple and with the pink flowers are entirely different.

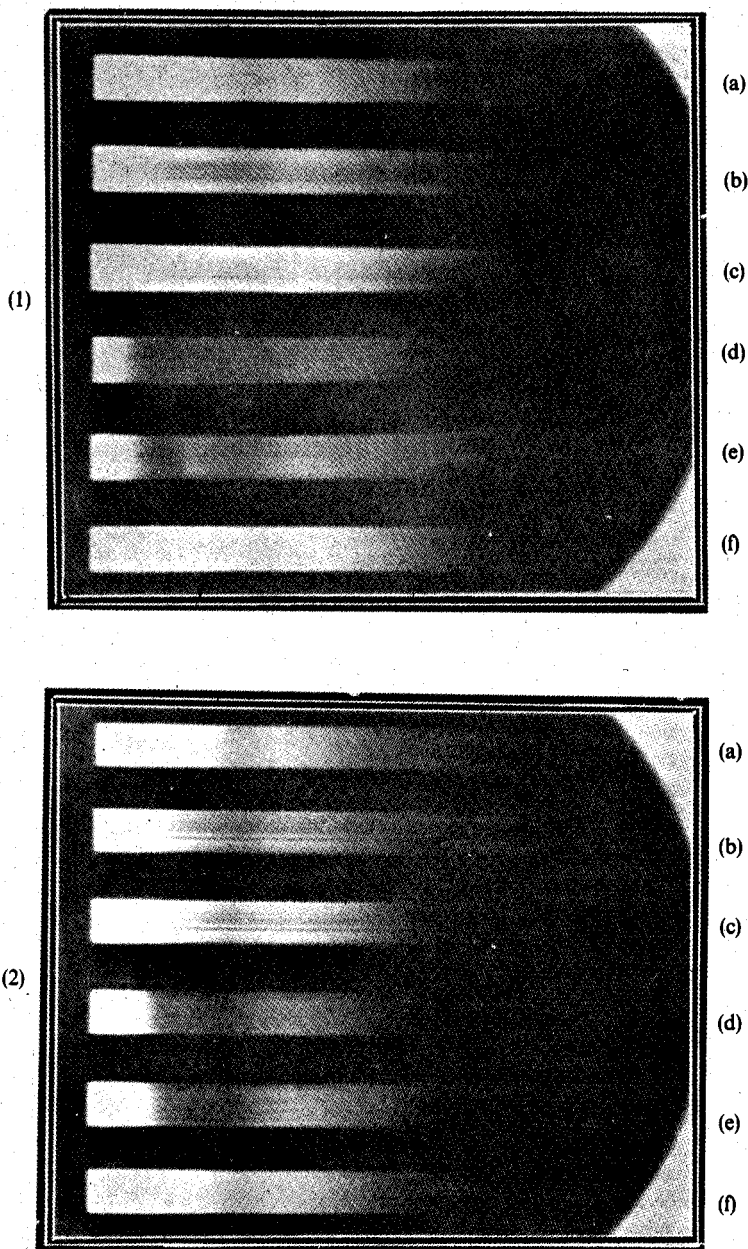
Strangely enough, the flower exhibiting a purple colour shows no absorption in the red, green and blue-violet sectors of the spectrum and these regions are seen



Figures 1 and 2. Flowers of *Lagerstroemia Flos Reginae*.

with their normally observed relative intensities. There is, however, an observable absorption of the yellow sector covering the region of wavelengths between 570 and 590  $m\mu$ . The pink flowers behave differently. The red and the blue-violet regions appear in the spectrum with their normally observed relative intensities, but the green sector, ranging from 520 to 570  $m\mu$ , appears greatly weakened. The absorption in the yellow by the purple flower and the absorption in the green by the pink flower are not very strong and hence it is not easy to exhibit them satisfactorily in a spectrum recorded by photography. But by putting two petals of each flower together and thus doubling the absorption path, it becomes easier to obtain satisfactory spectrograms.

Figures 1(a) and (f) in plate I are spectrograms of the light-source employed, while figures 1(b) and (c) are the spectrograms obtained with a single petal of the purple variety placed before the slit of the spectrograph, but with two different exposures. Figures 1(d) and (e) are spectrograms obtained likewise with two petals of the purple flower put together. The absorption band in the yellow sector of the spectrum can be clearly recognised in both of these figures (the diffuse band in the middle of the spectrum arises from the low photographic sensitivity in that region and should therefore be ignored). Figure 2(a), (b), (c), (d), (e) and (f) are spectrographic records obtained in a similar fashion with the pink flowers; (a) and (f) are spectrograms of the light-source, while (b) and (c) are the spectra recorded with a single petal of the pink flower placed in front of the slit of the spectrograph; (d) and (e) were recorded with two petals of the pink flowers held together. It can be seen on comparing the two sets of spectrograms that the absorption which gives rise to the purple colour in one case, and that which gives



Figures 1 and 2. 1. Spectra of the purple Lagerstroemia with comparison spectra. 2. Spectra of the pink Lagerstroemia with comparison spectra.

Plate I.

rise to the pink colour in the other case appear in quite different regions of the spectrum, as stated above.

Thus, in both cases, the chromatic behaviour of the "Queen of Flowers" presents us with what would seem strange anomalies to those who have adopted the current beliefs regarding the sensations excited by polychromatic light. Purple is the name given by them to the colour sensation excited by the superposition of red and violet, while green is the part of the spectrum which when superposed on purple should result in white light. Actually, as we have seen, the sensation of purple is excited by the entire spectrum of white light from which the yellow strip ranging from 570 to 590  $m\mu$  has been removed. Then again, the weakening of the green sector from 520 to 570  $m\mu$  in the spectrum leaving the rest unaltered should have resulted in a purple sensation. The actual result, as we have seen, is a bright pink.

### Summary

The flowering tree *Lagerstroemia Flos Reginae* (also known as *L. Speciosa*) has two varieties bearing purple and pink flowers respectively. Spectroscopic examination shows that the purple colouration represents the entire spectrum of white light in which the limited region from 570 to 590  $m\mu$  is absent. The pink colour results from a weakening of the spectrum in the range of wavelengths from 520 to 570  $m\mu$ .