

THE MOUNTING AND PRESERVATION OF PLANT MATERIAL IN THEIR NATURAL COLOURS

By N. C. KING

The problem of preserving plant specimens in their natural colours is of particular interest to scientific workers who require specimens for demonstration or record purposes. The method of keeping specimens in formalin or alcohol is suitable for those who are more interested in the structure than in the colour of the specimen. For those who have to demonstrate the colour changes associated with disease, nutritional deficiencies, etc., it is imperative to have some method whereby the colour can be fixed and kept over long periods.

The writer has concentrated on preserving sugarcane specimens. Numerous recipes have been tried but they all appear to have their limitations. The familiar copper acetate method has given good results with leaves, and preserved specimens have maintained their colour over a number of years. This method is particularly valuable when a specimen is received by post and in consequence has dried out. If the specimen is boiled in the copper acetate solution the normal colour is brought back and at the same time preserved. For those who are not familiar with this method the following is the procedure.

A saturated solution of copper acetate in 50 per cent. glacial acetic acid is made and is diluted in a ratio of 4 water to 1 solution. When the solution is new it has rather a blue colour, but after it has been used a few times it turns greenish, which seems to preserve the specimens in a more natural colour. The solution is brought to the boil and the leaves completely immersed. At first the leaves turn brown, but on continuing the boiling for 5 - 10 minutes, the leaves regain their natural colour. The leaves should then be taken out and washed well. The specimens are kept permanently in a 1 in 500 mercuric chloride solution. The container used for boiling the specimens usually presents some difficulty as the copper acetate solution eats away the usual metal laboratory containers. A trough to suit the specimens made out of copper with the corners brazed (not soldered) has been found to be completely satisfactory. It can be heated over a couple of bunsen burners, electric hot plates, or a heating element can be fixed to the bottom of the container, in which case the container should be well earthed.

The boiling in the copper acetate method sometimes destroys certain structures, and the following formula worked out by G. A. Vasha¹ has been found

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to give excellent results especially in preserving the green colour in leaves and the red colour in some of the cane stems. This method will preserve the green colour in both leaves and stems. The specimens should be washed well before immersing in the following solution:—

Fresh sulphurous acid	142 ml.
Ethyl alcohol	142 ml.
Formaldehyde	3 ml.
Clove oil	1 ml.
Copper sulphate	10 ml.
Acetyl-salicytic acid (Aspirin)	4 (5 grain tablets) 1.5 gm.
Water to make	1 litre.

When the specimens are immersed in this solution they turn a brownish green colour which after a few days turns to the normal green colour of the leaves. When this takes place, transfer the specimens to a fresh solution made up identically to the above, except that the copper sulphate is omitted. Yellow and brownish-red colours in the leaves have been found to be preserved. All cane varieties do not seem to respond equally well to this preserving technique. Some varieties turn brown but later do not turn completely green, resulting in rather a brown-green mottled effect. If the specimens are left too long in the preserving solution, the colour turns more to blue than to green. Varieties which behave in this manner should, if possible, be avoided.

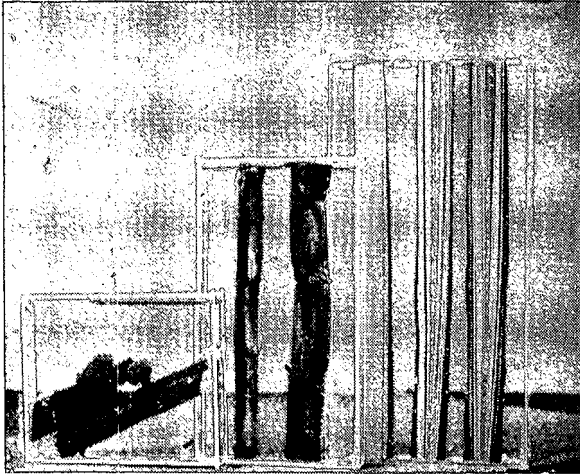
The following formula has been found to preserve the colour in cane stems, and has been very useful in preserving specimens of red rot of sugarcane:

Cobalt nitrate	15 gms.
Stannic chloride	10 gms.
Formaldehyde	25 ml.
Water	2 litre.

The specimens are thoroughly washed and then placed in the above solution. They should be kept in this solution for at least two weeks, after which they are kept in the holding solution which has the following formula:—

Formaldehyde	10 ml.
Ethyl alcohol	10 ml.
Sulphurous acid	30-50 ml.
Water	1 litre.

Specimens of red-rot, and some of the red coloured cane varieties, have been preserved for nearly 18 months and have shown very little colour change. The stems preserve very well and in the holding solution show no signs of fermentation taking place.



The photograph shows three specimens mounted in perspex jars

Mounting of Specimens

After the specimens have been preserved, they should be set up in suitable containers. One can use an assortment of jars and it is also possible to purchase glass museum jars, but they are never entirely satisfactory for specimens of sugarcane leaves and stems. It has been found that jars made out of perspex are entirely satisfactory, and have the advantages that they are nearly unbreakable, light, and can be made to suit the size and shape of the specimen.

For sugarcane leaf specimen, jars, 12" \times $\frac{1}{4}$ " \times 6", inside measurements, have been found to be very suitable, and for stem specimens suitable jars can also be made. For varieties which have rather a thick midrib it may be necessary to make the jars slightly wider. The perspex is fabricated by the

usual methods applied to woodwork, of planing and sand-papering the edges in order to make a tight fit. The adhesive used is ethylene-dichloride which has been thickened with the addition of chips of perspex until it assumes the consistency of syrup. With a dropper this adhesive should be run over the parts which are to be stuck together. The surfaces should be pressed together and kept under slight pressure for half an hour or so. This adhesive is superior to those usually sold as it dries slower, and if accidentally dropped on the surface of the perspex, no discolouration occurs.

At the time of making the jars the top and bottom should not be fixed. This should be done when the specimens are available, and then small pieces of perspex should be stuck on to the top and bottom in such a position that the specimen is held in a fixed position.

The rough edges can be smoothed with sandpaper and finally polished with perspex polish, which is sold for this purpose. Brasso makes a good substitute for the usual polishes.

One of the disadvantages of using perspex is the fact that it is rather soft and hence scratches rather easily. It is suggested for permanent displays that the specimens should be placed behind glass.

The President said that he thought that this was a very interesting paper for those interested in preserving plant materials.

Mr. Du Toit believed that Mr. King's paper would be of interest not only to South Africa, but also to other sugar-producing countries. He stated that he had travelled extensively in other sugar countries, but had never seen specimens better mounted than those of Mr. King's. He regarded the paper as a valuable contribution from South Africa to the rest of the sugar world.