PROTEA NEWS

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THE INFLUENCE OF THE FLOWER-HEAD ON LEAF BROWNING OF CUT *PROTEA NERIIFOLIA*

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Summary of Ph.D. Thesis obtained at the Rand Afrikaans University : June 1986

This study was undertaken to elucidate the involvement of the flower-head of the inflorescence of *Protea neriifolia* in the observed browning of leaves.

Leaf browning is the most important post-harvest physiological disorder of several protea species. Removal of the flower head of *Protea neriifolia* R. Br. inflorescences delayed the onset of leaf browning and resulted in a reduced uptake of vase medium. The flower head is apparently responsible for the development of a stress condition in the leaf cells by inducing a cellular water shortage there as well as by the withdrawal of nutrients.

Results have shown that the leaves on the inflorescence determine the volume of vase medium taken up although the flower head is also involved, albeit to a lesser extent. The leaves of inflorescences which are highly susceptible to leaf browning showed a typical climacteric respiration pattern while the leaves of inflorescences resistant to leaf browning respired at a much lower, but constant, rate over the entire sampling period.

The fresh mass of the approximately 300 florets normally present in a *P. neriifolia* flower head constitutes one third of the total fresh mass of an inflorescence. The mass of the florets showed a pronounced increase over a 26 day period which included five developmental stages. This increase apparently occurs at the expense of the other parts of the inflorescence.

The use of flower preservatives is essential to retard the onset of leaf browning in proteas. The effect of sources and 8-hydroxyquinoline sulphate (8-HQS) on leaf browning of harvested *P. neriifolia* inflorescences in a vase solution, was examined. Sucrose is an easily assimilable substrate which can replace the depleted intracellular carbohydrates and thus retard the degradation of other organic components. Results using only sucrose in the vase solution showed that concentrations of up to 10 g/ℓ delayed the onset of leaf browning effectively. Concentrations greater than 20 g/ℓ were harmful and accelerated leaf browning.

Harvested stems of *P. neriifolia* were placed in a vase solution containing labelled ^{14}C-sucrose ($U^{14}C$) for 18 hours. Under these conditions a greater amount of ^{14}C accumulated in the flower heads than in the leaves. However, similar stems in a vase solution containing ^{14}C-sucrose and an additional unlabelled 10 g/ℓ of sucrose accumulated more ^{14}C in the leaves than in the flower heads. A significant quantity of ^{14}C however accumulated in the flower head after 12 hours. A pulsing period of 12 hours should therefore, be adequate to ensure an efficient distribution of sucrose throughout the whole inflorescence.

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Vase solutions of 50 and 100 mg 8-HQS/ℓ retarded the onset of leaf browning but concentrations of 150 and 200 mg/ℓ accentuated leaf browning. Inflorescences in 8-HQS solutions retained a higher proportion of their fresh mass and showed a higher uptake of vase medium than inflorescences in distilled water. A combination of 5 g sucrose and 50 mg 8-HQS/ℓ reduces the browning percentage of inflorescences even further.

The respiration rate of leaves was raised by a 5 g/ℓ solution of sucrose but suppressed by a 50 mg 8-HQS/ℓ solution. The respiration rate of leaves decreased gradually when the vase solution contained a combination of both 5 g sucrose and 50 mg 8-HQS/ℓ. The respiration rate of the florets in the flower head was reduced by separate and combined treatments of 5 g sucrose and 50 mg 8-HQS/ℓ.

Transpiration from the flower head was reduced by covering the inflorescence with a polyethylene bag resulting in a lower volume of vase medium being taken up. Such inflorescences maintained their fresh mass to a larger extent than inflorescences which had not been covered. Covered inflorescences also showed a lower

incidence of leaf browning. The least browning occurred in inflorescences which were coverred by a polyethylene bag for 3 days immediately after harvesting.

The uptake of ^{14}-sucrose from a vase solution was inhibited by placing a polyethylene cover over the flower head. However, the distribution of ^{14}C in the cut inflorescence was not affected. Covering the flower head reduced the respiration rate of the leaves and florets and delayed the onset of the climacteric rise in respiration of the leaves.

The flower head of *P. neriifolia* inflorescence plays a significant role in the aetiology of leaf browning. Sucrose and 8-HQS have to be present in the vase solution applied to harvested inflorescences to prevent the depletion of respirable substrates in the leaves and to delay the onset of a water stress there. Inhibition of transpiration from the flower head and lowering of the metabolic activities of inflorescence tissues by precooling must be done immeidately after harvesting if control of browning of leaves is to be effective.

ECOLOGICAL RESEARCH AND THE WILDFLOWER INDUSTRY IN THE FYNBOS BIOME

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In discussing the issue of fynbos management with Richard Cowling of the CSIR (Fynbos Biome Project), we agreed that an effort should be made to involve researchers and commercial floriculturists in an open discussion of the perceived priorities. Organizational details will be handled by the CSIR unit which is located on the campus of the University of Cape Town.

Between mid-1984 and early 1985 a series of communications was circulated amongst researchers doing work linked to the Wildflower Industry in the southern and south-western Cape. This exercise, initiated from within the CSIR's Fynbos Biome Project, was aimed at identifying the common ground for the co-ordination of research efforts. At the time it was found that the relevant community of workers in the field was relatively small, and the dissemination of information on research and researchers was rapidly accomplished. Since then the field has expanded considerably and many projects then in their infancy (or less) have now gathered momentum and perhaps warrant some discussion.

The time is right for another review of ecol gically related research activities. The possibilities of improving the scope of the overall effort in this area needs to be assessed. Research objectives should be discussed by researchers and commercial producers involved in both veld-harvesting and cultivation. What is envisaged is a short and informal symposium at which invited speakers will address some of the problems linked with the utilization, conservation, and management of natural ecosystems within the fynbos biome as seen from both preservation and exploitation perspectives. It is intended that this should take place sometime during the first half of 1987.

Any queries or suggestions would be welcome and could be addressed to:
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PROTEA NEWS FROM S.A.

The Department of Agriculture and Water Supply and the South African Foundation have agreed to promote indigenous flowering plants through the Department. The foundation will make trial plots available on the farm Protea Heights, outside Stellenbosch, for use by the Research Institute for Vegetables and Ornamental Plants. At the signing of the agreement were head of department Dr Dawid Agenbach (right); Dr Anton Rupert (centre), chairman of the Nature Foundation; and Mr Sarel Hayward, Minister of Agriculture and Water Supply.

Research work will still be continued at the Tygerhoek experimental farm near Riviersonderend, but Mr Gert Brits and colleagues will be stationed at Elsenburg near Stellenbosch in future. Mr Kobus Coetzee and the rest of the Protea Entomology Section have already moved to Elsenburg. taking with them the largest collection of protea insects consisting of approximately 2 500 specimens.