Propagation of Ornamental Plants
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PREFACE

Special issue "New Methods of *in vitro* plant propagation"

The first report on successful tissue culture was published just over 100 years ago. In 1907 Ross Harrison, an American biologist and anatomist, cultured a frog-nerve cell in the laboratory. As he wrote in his 1907 article, *"When reasonable aseptic precautions are taken, tissues live under these conditions for a week and in some cases, specimens have been kept alive for nearly four weeks"*. It was this study that began tissue culture. Harrison was interested in the mechanism of growth of nerve cells and even did not realize that he had developed 'in passing' a new, revolutionary technology: tissue culture. At about the same time an Austrian, Gottlieb Haberlandt, conducted similar experiments with plant tissues but without much success. Haberlandt was also not interested in developing a new technology. For him, tissue culture was an aid to study the reciprocal influences of tissues on one another. In the 1930s, Phillip R. White was the first to obtain continuous growth of plant tissue in an artificial aseptic nutrient medium, when he tissue-cultured tomato root tips. This demonstrated that in vitro conditions could support plant growth and launched thousands of studies on plant tissue and organ culture.

The various essential components of plant tissue culture were discovered during the first 5 or 6 decades of the previous century. They concerned asepsis, organic and inorganic nutrition, plant growth regulators, and the use of support systems. Most of the subsequent developments in plant tissue culture involved protocols for different plant genotypes, increased efficiency of the system, and use as a tool for biotechnological innovations, such as gene transfer. Ever since the 1950s, the implementation of tissue culture in agriculture and horticulture has expanded enormously. Tissue culture has become an essential part of breeding, vegetative propagation (micropropagation) and freeing plants from endogenous pathogenic microorganisms. Many plants, though, especially adult forms of woody species, remain recalcitrant in culture. New research is necessary to solve these problems and to gain a fundamental understanding of how plants grow and differentiate under the unnatural and extreme conditions found in tissue culture.

The present micropropagation technologies use the basic knowhow that had been developed up to the 1960s. Nevertheless, these technologies are still far from being finished off. This special issue of POP concerns novel micropropagation technologies. Two reviews and one research paper deal with culture in liquid medium, which may be static or agitated in bioreactors. A major drawback in liquid medium is hyperhydricity (vitrification). A review paper deals with this malformation advocating the view that the most essential characteristic of hyperhydric tissues is waterlogging of the apoplast. In the 1970s and 1980s, somatic embryogenesis from cellsuspensions was envisioned as the future way of vegetative propagation which would replace shoot culture. A review discusses the present status and two research papers illustrate present-day research. A very different alternative for present-day micropropagation is photoautotrophic propagation. In a review, the advantages of this method over conventional shoot cultures are presented and the present issue also includes a research paper on this topic. In all, this special issue of POP gives an excellent overview of new methods in micropropagation.

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