SOMATIC EMBRYOGENESIS IN PEA

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Whole plant regeneration via somatic embryogenesis was obtained in pea using explants from immature embryos or shoot apex segments. Explants were placed on medium supplemented with MS salts (3), B5 vitamins (1), 3% sucrose, and 0.7% Phytagar (Gibco). Among auxin treatments, picloram and 2,4-D at 4.0 mkM in the absence of any cytokinin were most efficient for producing somatic embryos. After 25 to 35 days in culture, somatic embryos of different sizes could be observed on explants from immature embryos and shoot apex segments (Fig. 1,2). The level of auxin necessary for the induction of somatic embryos apparently prevented further development of young embryo stages and also repressed the germination of fully-developed embryos. Consequently, somatic embryos were transferred to a medium with only cytokinin (1.0 mg/l BAP) or with cytokinin in combination with a reduced auxin concentration (0.05 mg/1 NAA and 0.017 each of BAP, kinetin, and zeatin) (Fig. 3). Somatic embryos were obtained from immature zygotic embryos 2 to 9 mm in length. More data are presented in a paper published elsewhere (2).

Generally somatic embryos arise from the callus derived from embryogenic axes of zygotic embryos but can also develop directly from the cotyledon without an intervening callus phase. Somatic embryos from shoot apex cultures obviously emerge from the main and axillary shoot meristem regions.

Figs. 4a,b show longitudinal sections of a mature somatic embryo with a well-defined shoot meristem with leaf primordia (Fig. 4a) and a root meristem (Fig. 4b). The meristems are connected by procambium strands.

The results obtained so far indicate that there are genotypic differences in frequency of somatic embryogenesis from immature embryos and shoot apices, thus indicating that the ability to form somatic embryos is a quantitative rather than a qualitative trait.

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3. Murashige, T. and F. Skoog. 1962. Physiol. Plant. 15: 473-479.

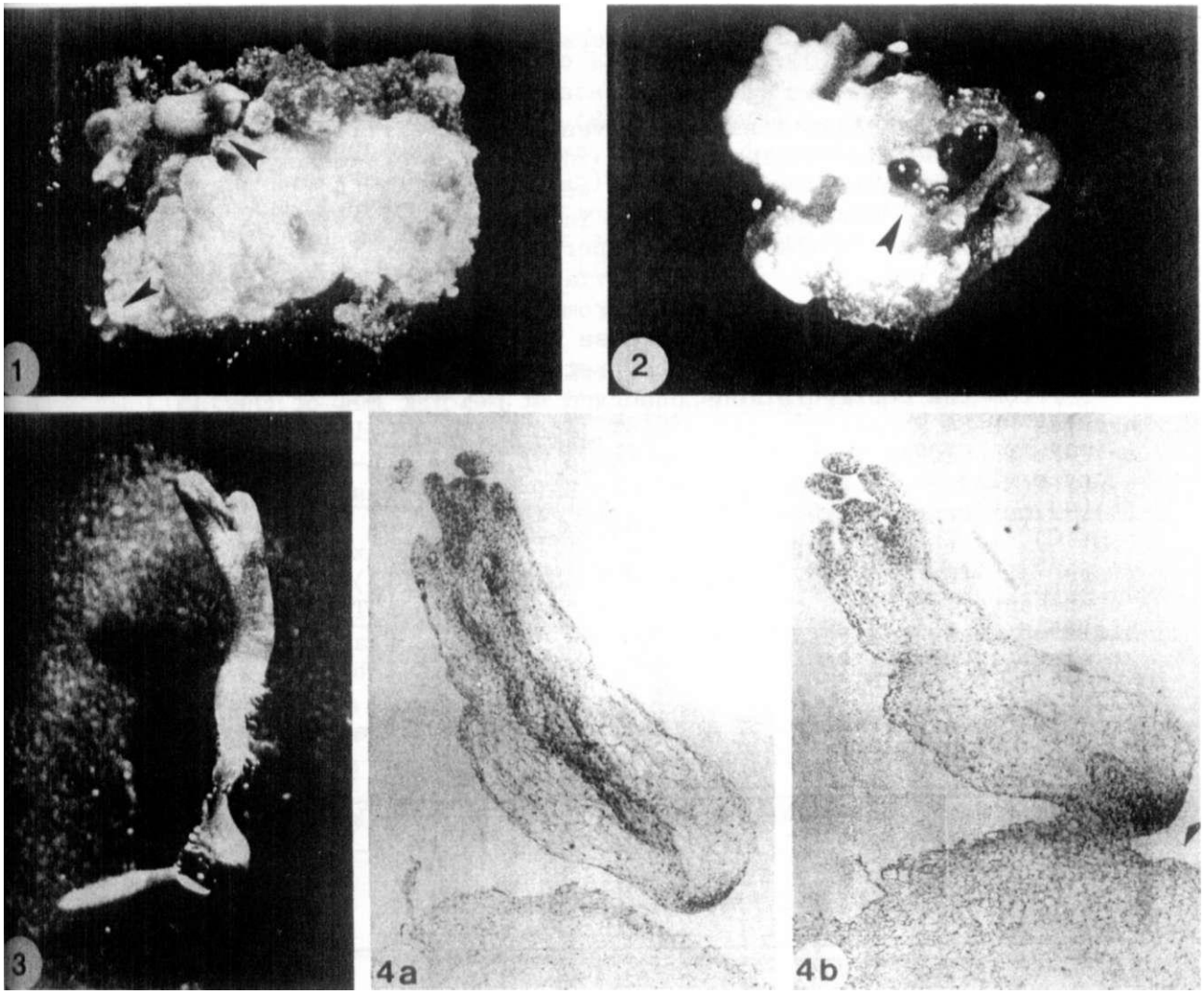

Fig.1. Somatic embryos from immature embryo culture of genotype R 4111, induced on medium with 4.0 mkM Picloram.

Fig.2. Somatic embryos from a shoot apex culture of genotype P. sativum var. arvense, induced on medium with 4.0 mkM Picloram.

Fig.3. A germinating somatic embryo of P. sativum var. arvense on medium with 1.0 mg/l BAP.

Fig.4. Longitudinal sections of a mature somatic embryo of P_. sativum var. arvense, induced on medium with 0.2 mkM Picloram. Sections were stained with Haeomatoxylin.

a Section demonstrates the shoot meristem with leaf primordia and procambium strands,

b Section showing the root meristem.

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