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Plant Regeneration from Callus Cultures of
Lithospermum erythrorhizon

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We have previously studied production of shikonin derivatives by cell lines of *Lithospermum erythrorhizon*. As a result, we obtained two cell lines, LE 16 and LE87, which are exhibiting high cell growth and high shikonin production. In the present study, the effect of auxin (2,4-D, IAA, Picloram, and NAA) and cytokinins (BAP and kinetin) on somatic embryogenesis and organogenesis during the subcultures of shikonin-producing cell line was investigated. The highest embryogenic and organogenic efficiency was obtained in modified MS medium with 2.0 mg/l NAA and 0.1 mg/l kinetin. The subcultured calluses showed the different morphologic frequencies depending on the NAA and kinetin concentration. Thus, morphologically normal plants have been regenerated from both cell line. Shoots subsequently produced roots on hormone-free MS medium and developed into plantlets. In most cases, a few thin roots were formed at the bases of the shoots after two weeks on the rooting medium.

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Changes of protein pattern during cold treatment
of Barley (*Hordeum vulgare*)

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During the adaptation of barley (*H. vulgare*) plant to low temperature, changes of protein pattern were studied by two-dimensional polyacrylamide gel electrophoresis. Barley grown under the light ($150\mu\text{M m}^{-2}\text{S}^{-1}$) at 25°C for 7 days was exposed to low temperature of 4°C . Total soluble proteins were isolated from the leaves of a cold-treated barley over a time course of 1d, 2d, 5d, 7d and 9d. The protein patterns revealed by two-dimensional electrophoresis consisted of more than 150 spots. Although the level of most of the protein products remained unchanged during cold treatment, reproducible changes due to cold storage were observed for at least 6 polypeptides. Four polypeptides were decreased differentially after 2d. Particularly, 2 polypeptides, 56 kDa and 20 kDa, were newly synthesized on the fifth day and seventh day of cold treatment and still continued to be maintained beyond 16 days at low temperature.