

Mungbean Sprouts Based on Growth Temperature

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This study is to analyze the effects of the growth temperature of mungbean sprouts (15–30±1 °C) on the yield rate, biological activities, content of total phenolic compounds, and content of total flavonoids of the sprouts. When the growth temperature of mungbean sprouts was higher, the yield rate of the sprouts was higher while the hard seed rate was lower. The crude extract rate of the ethanol was highest (17.9%) in the mungbean sprouts cultivated in the growth temperature of 25±1 °C. The DPPH radical scavenging activity of the ethanol extract of the sprouts was higher when the growth temperature was lower, while the activity of alcohol dehydrogenase and aldehyde dehydrogenase showed no regular tendency according to the growth temperature. The content of the total phenolic compounds of the ethanol extract of the sprouts was higher in the growth temperature of 15±1, 20±1, and 25±1 °C, while the content of total flavonoids was higher in the growth temperature of 15±1 and 20±1 °C. Considering the yield rate, biological activities, content of phenolic compounds of mungbean sprouts, the optimum cultivation temperature of mungbean sprouts may be 25±1 °C. Finally, the authors express their sincere appreciation to Rural Development Administration for financial support. Corresponding author: Dong-Kwan Kim, dkkim@jares.go.kr

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Cultivation Techniques of Mechanical Harvesting for Mungbean in Korea

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Mungbean should be harvested several times according to its physiological characteristics and atmospheric conditions of cultivation region. In Korea, mungbean is usually sown in June and harvested three or four times, and the cultivated area is being rapidly reduced. Therefore, the author developed cultivation techniques of mechanical harvesting suitable for the atmospheric conditions of the southern part of the Korean Peninsula. The optimum sowing time of mungbean for mechanical harvesting in southern part of Korea is around July 20. When sown around July 15, mungbean should be harvested twice and then the mechanical harvesting of mungbean was not possible. Meanwhile, when sown after July 25, the mechanical harvesting was possible but the mature stage was longer and the seed yield was decreased. Therefore, it is safe to say that in Korea the mechanical harvesting of mungbean is possible for the middle part of Korea when the plant is sown before July 20 and for the southern coast of Korea when sown after July 20 (if July 20 is set up as the baseline for the southern part of Korea). Out of Keumseongnogdu and Owoolnogdu, which are popularized cultivars in Korea most, Owoolnogdu is determined to be most appropriate for mechanical harvesting. Owoolnogdu is favorable for mechanical harvesting because, when compared to Keumseongnogdu, it is higher both in plant height and in pod setting height, and also the grain yield is better. Finally, the authors express their sincere appreciation to Rural Development Administration for financial support. Corresponding author: Dong-Kwan Kim, dkkim@jares.go.kr

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Effect of NaCl Salinity on Germination and Growth Parameters of Different Canola (*Brassica Napus L.*) Cultivars

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Salinity is a troublesome issue and of special concern in Southern Khorasan, consequently seeking salt tolerant varieties of canola as an important source of vegetable oil is of primary interest. Studies were conducted to find out the effect of salinity on germination and growth parameters of different canola cultivars at early growth stages. Germination response of six canola cultivars (Hayola, Talaye, Zargam, Okapi, RGS⁰⁰³ and SLM⁰⁰⁶) were studied over a range of NaCl solutions adjusted to ECs of 2, 4, 6, 8, 10, 12, and 14 dS.m⁻¹. Germination was also tested in distilled water as the control treatment. The results showed that salinity caused a notable reduction in germination percentage and also a delay in seed germination of all cultivars. However, there was a significant difference in the germination pattern of studied cultivars. The germination percentage ranking in ascending order for the

canola cultivars was: RGS⁰⁰³ < Zargam = Talaye < Okapi < Hayola < SLM⁰⁰⁶. In the second step, the effect of different salinity levels (of the irrigation water) including 1, 5, 10, and 15 dS.m⁻¹ on the plant growth in two canola cultivars (RGS⁰⁰³ and SLM⁰⁰⁶, grown in pots) was studied at early stages of development (6 leaf-stage). Results showed that increased salinity levels had a significant negative effect on chlorophyll content, shoot fresh and dry weight, root fresh and dry weight, leaf area/plant, and leaf no./plant of both cultivars. This study indicates that the adverse effects of salinity initiate very early in the canola life cycle. Corresponding author: Seyed Vahid Eslami, seyed.eslami@alumni.adelaide.edu.au

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Plant Growth and Differential Display Expression of Protein to the Foliar Application of Liquid Silica in Rice Plant

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This research seeks to find the overall effects of processing liquid silica fertilizer in panicle formation stage on growth and lodging prevention, and to compare the display expression of proteins in rice grains and flag leaves due to different levels of nitrogen processing. Yields increased in nitrous twice treatment plot and silica treatment plot in relation to conventional plot. Nitrogen application level and silica treatment plot was affected protein display expression and thus changed the display expression of band in SDS-PAGE. Aspects in SDS-PAGE Bands in each nitrogen treatment level were changed, as well the silica treatment plot in relation to conventional plot. Changes measured by 2-DE in display expression of flag leaves and seeds in relation to nitrogen treatment level and silica treatments were similar in fashion, yet still displayed distinguishable differences in display strength spots. Imaging analysis of a specific spot that was changed by nitrogen treatment level and silica treatments revealed changes in spot volumes, and thus demonstrated the verification of spot volume change using 2-DE process. As proteins identified by MALDI-TOF-MS, those are fructose-bisphosphate aldolase class-I, ribulose 1,5-bisphosphate carboxylase small subunit associated with flag leaf and retrotransposon protein, Os07g0214600 associated with seed storage. Corresponding author: SUN WOO, shwoo@chungbuk.ac.kr

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Chemical Composition and Biological Activities of the Essential Oils of Two Sclerorhachis Species From Iran

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Two species of the genus *Sclerorhachis* (Compositae) are found in Iran, which are endemic, *S. platyrachis* and *S. leptoclada*, and they are widely distributed in the Province of Khorassan, northeast of Iran. The volatile constituents of the aerial flowering parts of these two species were analyzed by GC and GC/MS. The major components of the *S. platyrachis* oil were camphor (35.5%), bornyl acetate (11.7%) and 1,8-cineole (8.0%) whereas in the *S. leptoclada* oil bornyl acetate (11.8.8%), camphor (17.7%) and δ -cadinene (6.9%) were major. Evaluation of the in vitro antibacterial and antifungal activities of the essential oils against seven Gram-positive and Gram-negative bacteria (*Bacillus subtilis*, *Enterococcus faecalis*, *Staphylococcus aureus*, *S. epidermidis*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*) and three fungi (*Candida albicans*, *Saccharomyces cerevisiae* and *Aspergillus niger*) is also reported. Key words: *Sclerorhachis platyrachis*, *Sclerorhachis leptoclada*, Compositae, essential oil, antibacterial activity, antifungal activity, bornyl acetate, camphor
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Physiological Responses of *Jatropha (jatropha Curcas L.)* under Cold Stress

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