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N^+注入对大豆种子发芽率及幼苗生理特性的影响

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摘要: 为了揭示幼苗生理生化指标的变化规律与N^+离子注入能量、剂量的内在关系，探索不同大豆品种适宜N^+离子注入能量及剂量，以4个大豆品种齐黄34（Q34）、德豆99-16（D99-16）、冀豆12（J12）、荷豆12（H12）为材料，采用6个处理（15 keV，$2.4\times10^{13}N^+\cdot m^{-2}$；15 keV，$4.8\times10^{13}N^+?m^{-2}$；15 keV，$7.2\times10^{13}N^+\cdot m^{-2}$；25 keV，$2.4\times10^{13}N^+\cdot m^{-2}$；25 keV，$4.8\times10^{13}N^+\cdot m^{-2}$；25 keV，$7.2\times10^{13}N^+\cdot m^{-2}$），研究了$N^+$注入对大豆种子发芽率及幼苗的超氧化物歧化酶(SOD)、过氧化物酶(POD)、过氧化氢酶(CAT)的活性、丙二醛和可溶性蛋白含量等生理指标的影响。结果表明：在一定的N^+注入的能量剂量范围内，随注入能量和剂量的增加，种子的发芽率、SOD、POD、CAT的活性、可溶性蛋白含量都表现为先增后降的变化趋势，而丙二醛含量的变化趋势与之相反。促进幼苗生长的各品种适宜N^+注入能量和剂量值分别为D99-16和J12：15 keV、4.8×10^{13} $N^+\cdot m^{-2}$；H12：15 keV、7.2×10^{13} $N^+\cdot m^{-2}$；Q34：25 keV、2.4×10^{13} $N^+\cdot m^{-2}$。诱变育种宜采用的能量、剂量值为J12、H12、D99-16：25 keV，2.4×10^{13} $N^+\cdot m^{-2}$，Q34：大于25 keV，$7.2\times10^{13}N^+\cdot m^{-2}$。

Abstract: In order to reveal the intrinsic relationships between changing rule of the seedling physiological and biochemical indexes and N^+?implantation energy and dose, exploring suitable N^+implantation energy and dose for different soybean varieties, effects of N^+?implantation on percentage of seeds, activities of superoxide dismutase (SOD), peroxidase (POD), and catalase (CAT), and contents of malondialdehyde (MDA) and soluble protein physiological indexes were researched using four soybean cultivars, namely Qihuang 34(Q34), Dedou 99-16(D99-16), Jidou 12(J12), and Hedou 12(H12), as materials and 6 treatments (15 keV, $2.4\times10^{13}N^+\cdot m^{-2}$; 15 keV, $4.8\times10^{13}N^+\cdot m^{-2}$; 15 keV, $7.2\times10^{13}N^+\cdot m^{-2}$; 25 keV, $2.4\times10^{13}N^+\cdot m^{-2}$; 25 keV, $4.8\times10^{13}N^+\cdot m^{-2}$; 25 keV, $7.2\times10^{13}N^+\cdot m^{-2}$). The results were as follows: In a certain range of energy and dosage, with the increase of the implantation energy and dose, the germination rate of seeds, the activities of SOD, POD and CAT, and soluble protein content all expressed a change trend of first increasing then dropping, and the tendency of the MDA content was on the contrary. Suitable values of energy and dose for N^+implantation, promoting the seedling growth of

various varieties, were D99-16 and J12: 15 keV, 4.8 × 10^{13} $N^{+}·m^{-2}$; H12: 15 keV, 7.2 × 10^{13} $N^{+}·m^{-2}$; Q34: 25 keV, 2.4 × $10^{13}N^{+}·m^{-2}$; respectively Appropriate values for mutation breeding were J12, H12, and D99.16: 25 keV, 2.4 × $10^{13}N^{+}·m^{-2}$; Q34: bigger than 25 keV, 7.2×10^{13} $N^{+}·m^{-2}$. The research was significant for soybean mutation breeding by N^{+}implantation method.

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