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技术及应用

微波辐射对苜蓿种子发芽及种带固氮菌固氮酶活性的影响

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摘要 为探明微波辐射对苜蓿种子萌发和种子内生固氮菌固氮酶活性的影响，以不同微波功率对种子进行不同时长的辐射处理，并测定了各处理种子的发芽率、发芽速率和种带固氮菌纯培养物的固氮酶活性。结果表明：800 W、20 s和500 W、40 s的辐射处理下种子的首日发芽率最高，分别极显著高出对照122%和88.9%(P<0.01)，且800 W、20 s和500 W、40 s处理的14 d总发芽率最高，分别高出对照 5.51% 和3.35%。800 W、24 s和500 W、40 s处理下，发芽4 d的种子胚根分别较对照伸长29.8%和41.9%；种带固氮菌的固氮酶活性对辐射时长较辐射功率更为敏感，两功率辐射下的短期处理能够明显提高种带固氮菌的固氮酶活性，超过32 s的处理则会使固氮酶活性显著低于对照。800 W、24 s处理下种子内固氮菌的固氮酶活性高出对照104.9%。

关键词 种子活力 微波辐射 乙炔还原法 固氮酶活性

分类号

Effect of Microwave Irradiation on Alfalfa Seeds Germination and Nitrogenaseactivity of Endophytic Diazotrophs in Seeds

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Abstract Various microwave powers were used to irradiate alfalfa seeds with various time to study the effect of microwave irradiation on nitrogenase activity of endogenous azotobacter and germination of seeds. Germination rate, germination speed and nitrogenase activity of pure cultures that derived from seed-carried azotobacter were tested. The results indicate that: 800 W, 20 s and 500 W, 40 s are found with highest germination rate on the 1st day, which is 122% and 88.9% times higher than the control group(P<0.01), and highest total germination rate is found within the 14-day period, which is 5.51% and 3.35% times higher than the control group, respectively. Under the two treatments, radical length on the 4th day is 29.8% and 41.9% times longer than the control group, and more sensitive nitrogenase activity is found on condition of various time than various powers. Short time treatments on condition of the two irradiation powers can increase nitrogenase activity conspicuously, and the treatments that treated more than 32 s make nitrogenase activity lower than the control group, conspicuously. Nitrogenase activity is found 104.9% times higher than the control group on condition of 24 s.

Key words seeds vigor microwave irradiation ethylene reduction method nitrogenaseactivity

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