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电磁振动式拌浆育秧水稻芽种播种机优化试验

Optimization experiments on electromagnetic vibrated seeder of rice bud-seed for field seedling raising

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中文摘要:

为了探明电磁振动式拌浆育秧水稻芽种播种机工作性能的影响规律并获得因素的最优组合，该文对拌浆育秧水稻芽种播种机进行了单因素和多因素播种试验。通过回归分析建立了挡种板开口高度、行走速度、排种盘振动速度和隔振橡胶垫刚度4个因素与播种量和播种合格率的单因素、多因素数学模型，分析了各影响因素及交互作用对播种量和播种合格率的影响规律及机理，进行了参数优化。结果表明，挡种板开口高度小于7 mm时，堵种现象较严重；挡种板开口高度和排种盘振动速度大，播种量和播种合格率大，行走速度大，播种量和播种合格率小；小的行走速度与大的排种盘振动速度组合，有利于提高播种合格率。参数的最优组合为挡种板开口高度9.3 mm，行走速度50.1 mm/s，排种盘振动速度13.1 m/s，隔振橡胶垫刚度1 248.9 N/mm。可靠性为95%的播种合格率总区间为86.72%～93.54%。该文为播种机的优化设计提供依据。

英文摘要:

In order to study the influence law of electromagnetic vibrated seeder for field seedling raising of rice bud-seed's performance and obtain the optimal combination of parameters, single factor and multi-factor experiments were carried out on seeder for field seedling raising of rice bud-seed. The relationship of the four influencing factors (opening height of retaining plate, walking speed, vibration velocity of seed plate and stiffness of vibration isolating rubber pad) and seeding quantity and seeding pass rate were established respectively by regression analysis. The influence law and mechanism of the factors and their interaction were analyzed, and the respective optimization of the parameters was obtained. The results showed that: opening height of retaining plate is less than 7mm, blocking phenomenon was serious; when opening height of retaining plate and vibration velocity of seed plate was big, seeding quantity and the pass rate of seeding was high, and when walking speed was large, seeding quantity and pass rate of seeding was low; combination of small walking speed and large vibration velocity of seed plate was beneficial to improve pass rate of seeding. Optimal combination of parameters was achieved under the condition that opening height of retaining plate was 9.3 mm, walking speed was 50.1 mm/s, vibration velocity of seed plate was 13.1 m/s, and stiffness of vibration isolating rubber pad was 1248.9 N/mm. The pass rate of seeding interval with 95% reliability was from 86.72% to 93.54%. This paper provides a foundation for optimization design of seeder.

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