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小型手推精量穴播机的设计与试验分析

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[摘要] 地膜覆盖播种技术依赖于精密穴播机。甘肃省地处西北丘陵山区, 大型农业机械作业困难, 而小型农机发展相对不足, 迫切需要适用于山区小地块播种的小型精密穴播机。因此, 设计了一种手推式小型精密穴播机。该播种机采用外置式种箱和窝眼轮式精量排种器, 能够有效避免种子拥堵和精量播种; 采用齿轮传动, 排种器排种和鸭嘴开启同步进行。田间试验结果表明: 播种机播种深度合理, 空穴率、穴粒数合格率等均合格, 满足作物播种农艺要求。

[关键词] 穴播机; 设计; 试验分析

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Design and Experiment Analysis of Small Manumotive Precision Hill-seeder

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[Abstract] Seeding technology of plastic mulching depends on precision hill-seeders. Gansu Province is located in northwest hilly areas, where it is difficult to operate large agricultural machines, while the development of small agricultural machines is insufficient. It's urgent for small precision hill-seeders suitable for planting on small plots of mountain. Therefore, a manumotive type small precision planter is designed. It uses external seed box and nest eye wheel precision seed metering device, can effectively avoid seeds congestion and conduct precision seeding. It also uses gear transmission, with seed metering device and duckbill mouth opening simultaneously. The results of field experiments show that the sowing depth of seeder is reasonable, the hole rate and the number of points pass rate are qualified, which meet the requirement of crop sowing.

[Key words] hill-seeder; design; experiment analysis

0 引言

地膜覆盖播种技术是干旱和半干旱地区用得较多的农业播种技术, 与传统播种相比, 它具有节水、保墒、抗旱、增产等优点^[1-3]。我国地膜覆盖播种面积逐年增加, 据不完全统计, 甘肃省的旱作农业粮食产量已占到全省粮食总产的 70%, 仅玉米一年的推广种植面积就达到 $7.3 \times 10^5 \text{ hm}^2$ ^[4]。地膜覆盖播种技术依赖于精密播种机, 精密播种机越来越受到重视。因此, 国内外很多专家学者对其进行了研究^[5-7]。目前, 国外及国内平川地区大都采用大中型精播机, 适合大面积机械化播种作业。

甘肃省地处西北丘陵山区, 发展机械化精密

播种受到各种因素的限制。大中型精播机体积大, 价格昂贵, 很难在丘陵山区小地带推广使用。该地区农民仍大量使用手提式点播机^[8]或采用人工点播, 不仅效率低, 劳动强度大, 浪费种子, 而且出苗效果差, 播深不一致、播行不整齐、缺苗断垄等现象严重。随着大量年青劳动力外出务工, 农村劳动力缺乏。

为此, 本文设计了一种适合山区丘陵小地带使用的手推式精密穴播机。该机轻便, 株距可调, 能够适应多类种子的播种。可节省人力和种子, 减轻了农民劳动强度, 实现了丘陵山区小块地精播作业, 提高了山区种植机械化水平。

1 穴播机结构与工作原理

1.1 整机结构

本文设计的穴播机适合山区丘陵地区小地块

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