

## 分根区垂向交替供水的节水机理及效应

### Mechanism and Water-Saving Efficiency of Alternate Watering in Vertical Profile

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英文关键词: alternate watering in vertical profile; compensative effect; root signal “ABA”; osmoregulation; critical water potential; water use efficiency

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中文摘要:

为了探索一种新的节水灌溉技术——分根区垂向交替供水的节水增产效应,以盆栽玉米为试验材料,选用3种不同的灌水方式(表面灌、下部灌、交替灌)和不同的灌水周期(3d、5d、7d)以及不同灌水方式下的相同灌水量组合进行了对比试验研究。结果表明,垂向交替供水是可行的。在相同的水势条件下,交替灌可提高作物的渗透调节能力,降低气孔关闭的临界水势,使光合产物从营养器官向生殖器官的分配增加,整株作物的长势呈现出苗壮、根旺的特点。此外,5d的交替灌与3d的表面灌相比,不仅作物的长势明显改善,且节水26%以上;7d的交替灌与5d的表面灌相比,作物长势无明显差异,但节水20%以上。试验的最终结果认为:5d的灌水周期是试验范围内交替灌应用时较为成功的方式。当土壤含水率控制时,拔节期下层土壤含水率应不低于54%的田持,上层土壤含水率应不低于40%的田持

英文摘要:

Under the condition of control test, by cultivating in pots containing soil, with maize as material, the new water saving technology which was named the Control Root splitted Alternate Irrigation (CRAI) was studied. The treatment included Surface Irrigation (SI), Low Irrigation (LI) and CRAI (CAI). The period of irrigation was 3d, 5d and 7d, separately. The watering amount was the same with the same period of irrigation. The result showed that the distribution model of carbohydrate was changeable. And more photosynthetic products were transformed to shoot. Besides, Crop growth of CAI with 5 days was improved than that of SI with 3 days and water use efficiency (WUE) was increased by 26%. Although no difference was found between the crop growth of CAI with 7 days and that of SI with 5 days, WUE was increased by 20%. On the other hand, crop growth of SI showed a much severe inhibition in the later of jointing stage as compared with LI and CAI. It was found that the critical water potential of CAI and osmoregulation capacity was raised. This was the probable reason why yield and WUE was improved of CAI.

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