



Simple and reliable irrigation scheduling calendars for arid regions

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The scarcity of water compared with the abundancy of land constitutes the main drawback within agricultural production in many arid regions. Besides the improvement of irrigation technique a task of primary importance is solving the problem of intra-seasonal irrigation scheduling under limited seasonal water supply and different sources of uncertainty (e.g. climate, soil conditions and management). To treat this uncertainty within a simulation optimization framework for irrigation management it is necessary to formulate a tractable probabilistic framework which avoids the considerable computational effort of Monte Carlo simulations. This is even more the case for ensuring food security since higher quantiles (90% and above) are of interest. Fortunately (from the point of view of the modeller), the variability of the climate variables in arid regions is small and the amount of rainfall is mostly negligible.

This makes it possible to determine generalized irrigation schedules which are independently applicable from year to year. This study demonstrates the high efficiency of a stack-ordering technique for the determination of generalized irrigation schedules which are based on a statistically appropriate sample sizes and a reliable optimal management. It is shown that this procedure works well for a tailor-made irrigation scheduling algorithm GET-OPTIS. Stack ordering is investigated for a agricultural area in the Batinah region of Sultanate of Oman using two irrigation models of complexity. The straightforward procedure yields considerable computational savings in comparison to always evaluating the full set of realizations.