??Study of some factors affecting growth of pecan seedlings

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studies on irrigation system performance and design have been the subject for many researchers. Field studies of level basins have shown the benefits of precision leveling to include increased yield and decreased water use.Numerous studies have been conducted and models developed for the simulation of one or more irrigation systems to evaluate system performance. Distribution uniformity is used to describe the performance of level basins. Standard deviation of soil surface elevations is used to indicate the precision ofland leveling.In this study statistical equations, Monte Carlosimulations and mathematical model simulations were used to predict the performance of level basins with various degrees oflevelness.The statistical low-quarter distribution uniformity SDUIIwas calculated by combining the effects of advance over a perfectly level basin DUN and soil surface undulations DUN,. These results over estimate the actual field uniformities because the effect of soil surface variations on advance is notincluded.Forty sets of 40 soil surface elevations were randomlygenerated for the Monte Carlo technique to provide a representative sample. Advance times for the forty locations145 for all the sets were calculated with SRFR for a level surface and the same field conditions as for the statistical method. The infiltrated depths were calculated assuming a uniform recession time for the basin, the infiltration rate was constant during recession, and the infiltrated depth is directly related to soil surface elevation. This gave 40 values of DUhimc from which and average was determined for the Monte Carlo method for each set of elevations. Values of SDUki and DU1qMC were compared and found to differ by less than 2 percent. Thus, it was concluded that the statistical method adequately predicts low-quarter distribution uniformity when the effects of soil surface variations on advance are neglected. This is important because the statistical method is much simpler than the Monte Carlo method and easier to incorporate into BASIN.Both methods confirm that increasing the standard deviation of soil surface elevations decreases the low quarter distribution uniformity. Both methods indicate good land leveling is need to attain high distribution uniformities.A third set of low-quarter distribution uniformities were obtained from SRFR simulations. To reduce the number of simulations, only one of the 40 sets of soil surface elevations was used. DUI0RFR was determined by running all 40 sets with sr30 mm. The set selected had a DUkisRFR value closest to the average of all the sets. In BASIN and in SRFR the application146 time can be based on a fixed time or advance distance expressed as R the ratio of advance distance at cutoff to total basin length. Input data for SRFR was obtained from BASIN for basin conditions similar to those for the statistical and Monte Carlo methods. SRFR simulations were made with sr from 0 to 50 mm for cutoff based on time from BASIN with R = 1 and R = 0.85 and cutoff based on calculated R = 1 and R 0.85 in SRFR. Since SRFR is a one-dimensional model, the values of DUkimua under estimate the uniformity. In actual basins the flow is two-dimensional and the water may flow around high areas, unless they extend entirely across the basin. Values of DUkimua were low for cutoff based on time because the advancing front did not reach the end of the basin for the higher sr and for the highest s, water did not reach the low quarter of the basin. When cutoff was based on distance, the average applied and infiltrated depths increase as sr increases because it requires more water to overcome the higher soil surface variations to assure water advances the prescribed distance.Also, as the stream size decreases (DUBAsIN decreases), the depth of application increases because the advance is more easily slowed or stopped by a high point of the soil surface and uniformities are lower. Clearly, soil surface variations decrease advance times and reduce uniformity. Although the uniformities were higher with cutoff based on distance, more water was applied which reduced the application efficiency.As expected DUNsm, values were lower than SDUN values. The DUNsRFR values represent the lower limit while SDUN represents the upper limit. However, SDUN is probably closer for most field conditions.For the range of values studied, the results of all three methods show that when the standard deviation of the soil surface elevations exceeds 20 mm, low-quarter distribution uniformities and efficiencies decrease rapidly. Since the literature indicates laser leveling can achieve standard deviations between 10 and 20 mm, but other leveling methods cannot, laser leveling is recommended to maximize efficiency and uniformity.from a practical view, if the irrigators goal is to adequately irrigate the entire basin, cutoff should occur when advance nears the end of the basin if the basin is poorly leveled. The application efficiency will be low so it is not a good strategy when water is limiting. Also, low application efficiencies result in excessive deep percolation, which may cause a high water table and the need for drainage and leach nitrogen from the root zone soil. 5.1 Recomandations For Future ResearchIn view of the results obtained during this study, the following areas are suggested for future research.1. This study needs to be continued with a wider range of field conditions such as higher and lower infiltration rates.2.Adding the equations of statistical low-quarter distribution uniformity (SDUO to the BASIN program.3.Develop a two-dimensional model and compare the results with SDUw.4.Comparing SDU4 results with actual field data.5.Determine the economic feasibility of providing the leveling precision required to obtain high uniformities and efficiencies.