

manual that gives detailed steps necessary to prepare a CP system for operation at the beginning of the season, the maintenance during operation and the things that should be done to prepare the system for long periods when it is not used. New CP machines seldom need repair parts, but a source of repairs will be needed for several years after the installation. There are special requirements for transport (Figure 10.8), storing, loading/unloading the CP and erection of the systems.

FIGURE 10.7 - The erection of a center pivot.

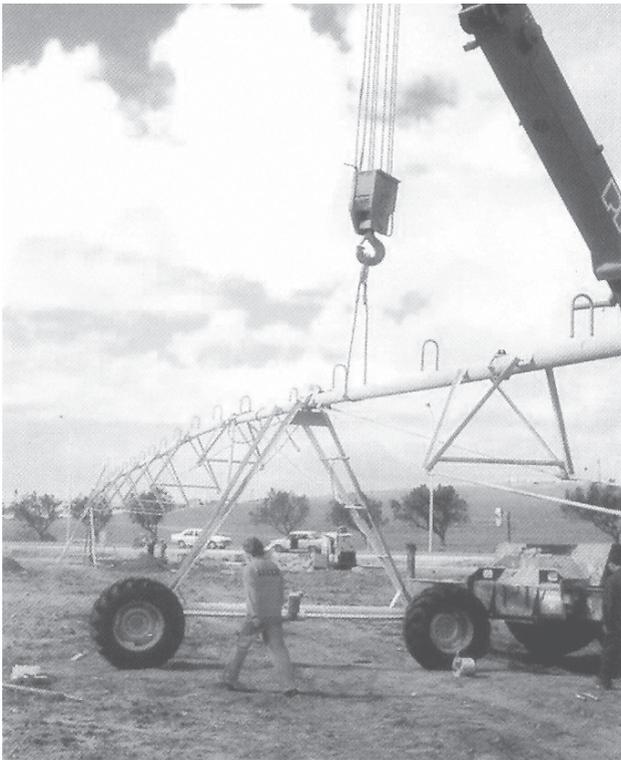


FIGURE 10.8 - Towing the system.



Application rate and frequency of irrigation

All systems and irrigation methods are planned to apply water at rates equal or less the soil infiltration rate. CP is designed to be for the most part, independent of soil intake rate. Instead, CP design is based on the application volume per irrigation not exceeding the surface storage volume. With spray heads the wetted diameter greatly exceeds that with bubblers, however surface runoff occurs and reduce the application efficiency as well, as the uniformity of application, due to the redistribution of water in the field. The travel speed is important factor in designing these systems. In most cases the CP must run at a greater travel speed to compensate for the additional water reaching the ground. The irrigation frequencies are shortened and the irrigation application smaller. Irrigation Detailed irrigation programs should be prepared on the spot. In

any case the in the semi-arid regions CP irrigation systems should be designed for crop requirements up to 8–9 mm/day at peak demand and increased daily operating hours during this period.

Special Considerations

The type and kind of soils – their topography, water holding capacity, and infiltration rate – are among the principal factors controlling the successful application of the CP. A major problem is that this type of CP system results into a very high precipitation rate, because the small emitters (sprayers and bubblers) have very small diameter coverage, (higher amount of water over a smaller area). This usually leads to the soil intake rate being exceeded, thus causing water run-off, or water ponding. In such cases additional runoff prevention practices are needed. CP systems operate best on soils with high infiltration rates that absorb the water at the point of impact and the nearby area. Runoff usually collect in low areas and log down the towers wheels. It tends to concentrate and create erosive streams. The one method to reduce runoff includes small dikes between the rows and the formation of small basins that keep the water where it falls, allowing it to be absorbed into the soil. Remedial tillage is necessary.

The CP systems operation are more trouble-free on level lands and on uniform sloping fields with slopes up to 3 percent. Slope differences can be up to 20 percent in the radial direction on rolling ground. In the circular direction the pipeline can move up and down slopes of 15 percent on plain fields or with shallow furrows. Where furrows are more than 0.15 m deep the ground slopes should never exceed 10 percent. Undulating topography may produce a lot of difficulties especially where runoffs occur. Substantial runoff or translocation occurs on deep slopes under CP irrigation without remedial tillage even if the soil is very sandy and water application is light. Because of the higher application rates than the infiltration rates significant runoff can occur on slopes greater than 3 percent. This problem can be remedy by performing some modifications the soil surface, or by the use of sprayers with larger diameter coverage, thus to apply water over a larger area.

On fields with uneven gradients variations in pressure can adversely affect the uniformity of application if pressure regulators are not used at each nozzle. With the use of circular CP, approximately 21 percent of a square field remains without irrigation. With the use of end guns this area is reduced to 15 percent.

In heavy loamy soils when wet soil does not support the weight of the wheels and deep ruts are cut, filling the ruts with sand can provide temporary solution to prevent stalling of the pipeline. If the soil becomes sticky as well, the pipeline may bog down if the land becomes too wet.