An Introduction to Irrigation Pump Selection

Is your current pump performing efficiently under all operating conditions? In many nurseries, the system duty is likely to have changed over time with changes to growing areas and infrastructure. When upgrading pump systems, an analysis of the system pressure and flow rates is necessary to compare different pumps, pump curves and control systems, to give an efficient system that meets the irrigation requirements of the nursery. Replacing a failed pump is the ideal opportunity to improve the pumping system, but some preparation and system analysis is required well in advance so the down time of the irrigation system is minimised.

Each situation has to be assessed on its merits, but the points that should be considered in the selection of a pump are:

- The system requirements. System design capacity is a critical part of selecting the correct pump for the situation, and calculating the maximum amount of flow to achieve irrigation in the required time frame should be the very first item addressed.

- The discharge and pressure (or head) required. This information is obtained from a hydraulic analysis on the system to determine the pump performance required. A full hydraulic analysis of a system can also show up areas of the system that aren't performing to their maximum efficiency, and suggest changes that may help to reduce operating costs e.g. altering pipe sizes.

- Suction conditions. Pumps have a limit of suction lift which, if exceeded, results in cavitation, reduction in operating efficiency and damage to the pump. It should also be noted that, as the height of the pump above the water level increases, the efficiency of the pump decreases resulting in decreased flow and pressure.

- Frequency of operation. In particular, where irrigation is used for frost protection, the pump must have the capacity to deliver the necessary amount of water in the required time for effective frost control.

- Reliability required. In most nursery situations high reliability of pumps is necessary. This may mean a multiple pump system being installed so the system can still perform if one pump fails, although at a reduced capacity.

- Source of power available. In some situations ready access to mains power isn't possible, or is prohibitively expensive. Other fuel sources such as diesel must then be considered, and may reduce the range of pumps available for the particular situation.

- Cost per unit of energy. To minimise running costs, an appropriate electricity tariff should be selected, which may in turn reduce the length of time the system can be run for in a 24 hour period, thus increasing the pump flow rate required. If other fuel sources are an option, the overall cost of these need to be compared before deciding in the best alternative.

- Capital cost, depreciation, running costs and interest charges. The cost and installation of a pump is approximately 10% of the lifetime cost of the pump. The selection of the right pump, while perhaps being initially more expensive, reduces the total cost of the irrigation system over time.

- Physical constraints. For example, is a bore hole pump required and what size is the casing?

- Pump protection. Does an electric motor need waterproofing? Does the pump need to be protected from flood water or designed to be relocated in the case of flood?

- Potential for corrosion and wear. Poor water quality and particulate matter in the water can lead to increased wear if the pump isn't designed to handle the water quality or filtration is inadequate.

Lex McMullin
Farm Management System Officer
Mob: 0400 005 236 - Email: fmso3@ngiq.asn.au