

# Fertilizer and Water Efficiency

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## Factors Influencing Plant Growth Can Be Altered by Man to Increase Production

With water efficiency becoming more and more the keynote in Arizona agriculture, any factor which increases the efficiency of such applied water is of prime importance.

### Many Factors

Many factors influence plant growth directly, while some factors are inter-related with others in effecting their influence on plant growth. The importance of any one of these factors is negligible without the influence of the others. Many of these can be, and often are, altered by man. Through such alterations man attempts to improve the chances of individual crop plants to produce their maximum genetic ability.

Water is one of the extremely important growth-promoting factors. But without an adequate supply of such other factors as light, temperature, soil, fertilizer elements, etc., its importance would be infinitely less.

For instance, if we consider water efficiency as "that soil moisture condition which permits maximum plant growth and greatest yield of high quality marketable products," then the influence of fertilizers becomes exceedingly real. Growing a crop under low fertility conditions requires essentially the same amount of water under irrigated agriculture as a crop grown with an optimum availability of plant nutrients.

This being true, mere calculations in terms of crop yield will reveal the increased efficiency per unit of applied water. Applying fertilizer ni-

trogen, for example, to a nitrogen impoverished soil will greatly enhance plant growth and ultimate yield.

Table I indicates a sharp increase in water-use efficiency with all fertilizer materials, as compared to the check with an inadequate fertilizer level. Not only is the applied water used more efficiently, but there is an efficient production of the highly desirable 36-size melons.

This is an example of a very tangible efficiency in terms of dollars and cents. One may say, "Is that not the effect of the applied fertilizer?" Certainly, but it also reflects, indirectly

at least, the efficiency of the soil-water relationships to yield. Keeping the moisture level at or near the optimum and increasing the yield by overcoming a nutritional stress or deficiency would indicate that soil moisture is far more efficiently used under these more ideal conditions than when an inadequate amount of fertilizer is available.

The effects of fertilizer on increasing water efficiency is not restricted to any one type of fertilizer. This desirable effect will hold true for any single fertilizer element or group of fertilizer materials, provided an improvement in crop growth and yield are realized by such an application.

Further, the use of fertilizer materials to improve water efficiency through crop response is applicable to all agricultural crops grown under irrigated agriculture in Arizona. Hence, the implication, regardless of crop, is that the proper use of fertilizers (see picture below) will provide a more efficient use of water through improved growth and/or yields.

Excessive fertilization is as effective in reducing the efficiency of applied water by depressing yield as is the lack of proper fertilization. Therefore, improper fertilization, either the lack of or an excess of fertilizer materials, will result in an inefficient usage of irrigation water.

**TABLE I.—Effects of Fertilizer on Yield and Water Use Efficiency with Cantaloups.**

| Fertilizer          | Sizes and Yields<br>In Crates per Acre |      |      | Total Yield<br>Crates/Acre<br>45-36-27's | Water Used<br>Acre Ft.<br>per Crate | % Increased<br>Efficiency per<br>Unit of Water |
|---------------------|--|------|------|--|-------------------------------------|--|
|                     | 45's                                   | 36's | 27's |  |                                     |  |
| No Fertilizer ..... | 56                                     | 81   | 34   | 171                                      | .0132                               | 0.0  |
| Fertilizer A .....  | 42                                     | 123  | 69   | 234                                      | .0096                               | 27.3   |
| Fertilizer B .....  | 57                                     | 159  | 34   | 250                                      | .0080                               | 39.4   |
| Fertilizer C .....  | 56                                     | 104  | 50   | 210                                      | .0095                               | 28.0   |
| Averages .....      | 53                                     | 117  | 47   | 216                                      | .0101                               | 31.6%  |



Band placement of fertilizer on cantaloupe crop. An excellent and efficient method of applying fertilizer for row crops. Each crop has specific requirements as to amount, location, method, and time of application. Note specific distances for cantaloupe fertilizer placement.