## COMPARISON OF VIGOR INDICES FOR IRRIGATED DESERT COTTON J.C. Silvertooth, E.R. Norton, and P.W. Brown Extension Agronomist, Research Technician, and Extension Biometeorologist, respectively. University of Arizona Tucson, AZ.

## Abstract

Cotton (Gossypium spp.)is a very dynamic crop which shifts in it's vegetative/reproductive balance in response to environmental conditions and management. While the ultimate goal and objective in a cotton production system is to produce as much lint as possible in an efficient fashion, a certain amount of vegetative development (leaves, stems, roots, etc.) is necessary to provide the framework to support the production of the yield component (bolls). However, a common problem associated with a cotton production system in many regions is that of rank or excessive vegetative growth. Therefore, one of the more challenging aspects of cotton production and management is that of attaining an optimum balance in the vegetative and reproductive plant components. Similarly, it is an equally challenging research objective to identify what constitutes a well-balanced plant. In the past 10 years, a great deal of effort has been directed towards a better and more detailed understanding of cotton growth and development. One result of this effort has been the proliferation of information regarding plant mapping. Plant mapping is a rather general term which commonly involves the systematic and quantitative measurement of a crop's fruit load and it's vegetative/reproductive balance. One critical element that is necessary to make plant mapping useful, is some standard or basis of comparison to determine what is "normal" or to what extent there is a departure from a normal or desired condition. Due to time and labor requirements associated with conducting a complete plant mapping, there has been a strong interest in developing a "vigor index". Several vigor indices have been proposed and developed to various levels. These indices include: height to node ratios (HNR), length of the top five nodes, growth rates, and static growth limits. Presently, there does not exist a standard or uniform approach across the U.S. cotton belt. For further development and implementation, there is a need for consistency in the use of a vigor index. Each of the aforementioned techniques are evaluated in the context of irrigated cotton production in Arizona. The Arizona evaluations are based upon an extensive database developed over eight crop seasons and approximately 25 sites per season across representative cotton producing areas in Arizona, which range from 100 to 3,000 ft. elevation (above sea level). Comparisons are made in terms of advantages and disadvantages associated with each technique. The following four conclusions are made: 1) the HNR offers the best overall vigor assessment at present; 2) baselines or standard references are critical to the utility of any vigor index, probably needed on a regionally specific basis; 3) trends are probably more important to consider for any vigor index as opposed to solitary measurement; and 4) any vigor index will provide most useful information when used in concert with fruit retention information.

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