INTRODUCTION

Humans depend on plants in nearly every aspect of life. We use plants for food, both directly and as secondary consumers. We use plant structural components as building materials and textiles, and plant metabolites for their nutritional and medicinal properties and as industrial raw materials. Photosynthesis provides the biological and chemical energy that fuels our world and is responsible for the oxygen and carbon dioxide cycling that makes our very existence on Earth possible. The importance of plants in our world cannot be overemphasized.

Although these facts have been true throughout human history, gaining knowledge about the biology of plants has never been more important than at this moment. The population of the world is expanding rapidly: at 2.5 billion in 1950, the population has more than doubled to 6.2 billion today, and is estimated to reach the 7 billion mark in just over ten years (US Census Bureau). It seems clear that in order to feed this growing population, world food production must be increased, especially in regions of the world with the greatest population density. Because the world's arable land is already utilized almost to its limit, it will be necessary to find new ways to improve crop yields, and to do so in an environmentally friendly fashion.

Large strides have been made in plant research in the last decade. Research has given us insight into the natural processes of disease resistance, response to environmental stresses and plant metabolism, to name just a few. We have also begun to understand the developmental processes, biochemistry, and physiology of many species of plants.

This research has provided tantalizing clues about a future in which we can utilize our knowledge to make positive changes in plant species of economical importance. Possibilities include enhancing resistance to disease caused by insect, bacterial, viral and parasitic pests; increasing tolerance to abiotic stresses, such as heat, drought and soil salinity; and doing these things while decreasing dependence on chemical fertilizers and pesticides. The amount of an important nutrient that is present at unhealthy or low levels in a crop can be increased, other nutrients introduced, or adverse components removed to enhance nutritional value. The net result will be plants that produce more, higher quality food and resources for our growing population.

These goals cannot be accomplished until we have achieved a deep and thorough understanding of plant biology. We cannot hope to improve a plant until we know how it functions under normal conditions, how it responds to altered conditions, and how such a response affects the physiology of the entire organism. The task of achieving an exhaustive knowledge of the biology of even one plant seems daunting, indeed. However, it must be done.

As all properties of a living organism are determined by its genetic constitution through interaction with its environment, the starting point is to discover the structure and function of each gene of a flowering plant and determine its role in the control of the metabolic and developmental processes of the plant.