

APPENDIX A2

EFFECTS OF OZONE AND SULFUR DIOXIDE ON CROP PRODUCTIVITY**A2.1 OBJECTIVES**

This chapter reviews current knowledge concerning the effects of ozone (O_3) and sulfur dioxide (SO_2) on crop productivity. The objectives of this review are to provide insight to the selection of appropriate air pollution variables; to suggest the expected magnitude, both relative and absolute, of air pollution-yield relationships for the selected crops; to develop testable hypotheses concerning O_3 and SO_2 effects upon crop production, separately and in combination with each other and other environmental attributes; and to provide laboratory evidence which can be used to validate the field data regressions or provide alternative damage functions.

Previous literature reviews demonstrate air pollutants have long been known to affect plant health and crop production (Katz et al., 1939; Halliday, 1961; Treshow, 1970; Naegele, 1973). This chapter will not repeat this documentation, but will summarize the most recent and relevant research pertaining to the effects of O_3 and SO_2 on crop yields, specifically for the principal study crops. Documentation is limited to research which provides air pollutant concentrations, exposure times, and yield or injury data. The chapter summarizes the reviews with a grouping of the study crops into sensitivity categories, and an assigning of damage functions or categories for other crops grown in the San Joaquin Valley and analyzed in the California Agricultural Resources Economic Model (see Chapters 5 and 6).

A2.2 BACKGROUNDHow Pollutants Affect Plants

Sulfur dioxide emanating from smelting and home heating has damaged plants since before the turn of the century (Halliday, 1961). Concentrations then were far higher