

*Plants.*—An extensive body of literature exists on the response of higher plants to chemical mutagens and many of the techniques laboriously worked out for experiments with physical mutagens should be equally applicable to experiments with known or suspected mutagens (30, 46, 61, 105).

Since the literature indicates that many of the well known mutagenic and/or chromosome breaking chemicals are as effective in plant material as in animal test systems and since several of the plant systems can detect effects of such substances applied in the gaseous state (95), and since some, if not all, plant species are highly susceptible to chemical mutagens, appropriate plant material should be included in the battery of tests to be performed in screening or testing for mutagenicity of various chemical compounds. Further, since plant chromosomes are structurally more akin to mammalian chromosomes than are those of viruses, bacteria and other prokaryotic organisms, responses of plant chromosomes to chemical mutagens should provide valuable information with respect to their possible mutagenicity in mammals. Also, the factors determining the inherent radiosensitivity of plant cells are now fairly well understood (102) and this knowledge may offer valuable guidance for work with chemical mutagens.

Plant test systems include many species and a considerable variety of possible procedures at various stages of development (table 1). It is not feasible to select a specific test as the best in all possible cases. Circumstances and objectives of the experiment would determine which test and which species should be recommended.

The efficiency of the various plant test systems varies widely. However, some of the most efficient ones compete favorably with other nonplant tests and some e.g., *Tradescantia*, have the advantage that they can be used as monitors over long exposure periods. Inspection of the flowers for somatic mutations once or twice a week should reveal quickly whether or not a level of mutagen exposure has occurred. Of course, the lower the level or the shorter the exposure, the more effort is required to show a significant increase above the normal background rate. *Tradescantia* is especially sensitive to both ionizing radiation (66, 97) and chemical mutagens (95), with the effects of a few rads being readily detectable and saturation of the somatic mutation rate occurring around 200 R of gamma rays (72). Some other plant systems such as somatic mutation in *Nicotiana* are also very sensitive (86); those in which mutations, chromosome aberrations or lethal effects are readily detectable in microspores or pollen tend to be highly efficient (table 1).

A partial list of chemical mutagens and/or pesticides known to be effective in higher plants is given in tables 2 and 3. Several other