

Abstract: The refuge plus high-dose resistance management strategy for transgenic crops producing *Bacillus thuringiensis* Berliner crystal protein toxins (*Bt* crops) assumes that resistance is rare and functionally recessive. We propose an F<sub>2</sub> screening procedure to estimate the frequency of rare resistance alleles in natural insect populations and acquire them for further testing. The procedure preserves genetic variation in isofemale lines and concentrates the resistance alleles in homozygous genotypes where they can be detected, whether they are recessive or dominant. Bayesian statistics for estimating allele frequency and credibility intervals, and the probability that the screen will not detect a resistance allele are derived. Compared with other methods for detecting and estimating resistance alleles, the F<sub>2</sub> screen will be efficient and accurate, extend the sensitivity of allele-frequency estimation for recessive traits by more than an order of magnitude compared with a discriminating-dose assay, and detect all resistance traits segregating in the initial sample of field-collected insects rather than a subset that responds most rapidly to laboratory selection.

J. Econ. Entomol. 91(3):572-578 (1998)