Knockdown Resistance Allele Frequency in Field Populations of *Plutella xylostella* in Korea

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To investigate the current status of pyrethroid resistance mediated by the nerve insensitivity mechanism in Korean populations of *Plutella xylostella*, PASA-based genotypings for the detection of the T929I and L1014F sodium channel mutations, known to confer pyrethroid knockdown resistance, were conducted with 10 representative regional field populations in conjunction with the bioassay using fenvalerate and cypermethrin. Moderate to high levels of pyrethroid resistance were determined in all the regional populations investigated as judged by LC50 values. Individual genotyping revealed that the T929I and L1014F mutations exist en bloc as a haplotype, and the frequencies of the L1014F and T929I mutations are 100% and 70-100% in all examined field populations, respectively, correlating well with pyrethroid resistance levels. To predict when the two mutations first arose and how quickly they spread, we examined the frequency of the mutations in dry *P. xylostella* adult specimens collected from 1974 to 1995. Unexpectedly, the L1014F was observed even in the specimens collected in 1974 long before the selection of *P. xylostella* population with pyrethroids, whereas the T929I mutations began to show in 1995 after extensive selection with pyrethroids. These findings indicate that the L1014F mutation occurred first, perhaps due to initial selection by DDT, whereas the T929I mutation was selected subsequently by pyrethroids as a second mutation. In summary, high frequency of the knockdown resistance alleles indicates that pyrethroid resistance by the nerve insensitivity mechanism is at an almost saturated level in the representative Korean populations of *P. xylostella,* demanding more intensive regulation of pyrethroid use for its control. Use of efficient genotyping techniques, such as PASA, should greatly facilitate the monitoring of *P xylostella* resistance in the field.