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Use of Transgenic Strains of Insects in the Screwworm Program

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Title: Use of Transgenic Strains of Insects in the Screwworm Program

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Interpretive Summary: Transposable element (TE)–mediated transformation of non-drosophilid insects is becoming a viable and robust gene introduction method for many insects of economic and medical importance (Handler 2002). Transformation may be used for gene identification and characterization, and for creating strains with genes encoding lethality or sterility. The New World Screwworm (NWS), *Cochliomyia hominivorax* (Coquerel), was once a devastating, repulsive, and costly pest of livestock and other warm-blooded creatures (including humans) in the United States and Mexico. It has been successfully eradicated from the entire North American continent. The eradication program was the first implementation of the sterile insect technique (SIT). The annual estimated savings benefit to livestock producers in the U.S. and Mexico exceeds \$750 million (Wyss 2000). This insect is prevented from reinfesting North America by the ongoing release of sterile, irradiated adult flies at the barrier zone in Panama. Sterile flies for release are produced in a highly secure mass-rearing production facility in Tuxtla Gutierrez, Mexico. Transformation technology now has been adapted for and applied to the NWS. Using a piggyBac TE system, a green fluorescent marker gene has been introduced to the germ line of a laboratory strain (P95) of screwworms, resulting in several transgenic lines of uniquely marked strains. The genetics and characterization of these new transgenic lines will be presented, along with discussion of the utilization of transgenic insects in the NWS SIT Program.

Technical Abstract: Transposable element (TE)-mediated transformation of non-drosophilid insects is becoming a viable and robust gene introduction method for many insects of economic and medical importance (Handler 2002). Transformation may be used for gene identification and characterization, and for creating strains with genes encoding lethality or sterility. The New World Screwworm (NWS), *Cochliomyia hominivorax* (Coquerel), was once a devastating, repulsive, and costly pest of livestock and other warm-blooded creatures (including humans) in the United States and Mexico. It has been successfully eradicated from the entire North American continent. The eradication program was the first implementation of the sterile insect technique (SIT). The annual estimated savings benefit to livestock producers in the U.S. and Mexico exceeds \$750 million (Wyss 2000). This insect is prevented from reinfesting North America by the ongoing release of sterile, irradiated adult flies at the barrier zone in Panama. Sterile flies for release are produced in a highly secure mass-rearing production facility in Tuxtla Gutierrez, Mexico. Transformation technology now has been adapted for and applied to the NWS. Using a piggyBac TE system, a green fluorescent marker gene has been introduced to the germ line of a laboratory strain (P95) of screwworms, resulting in several transgenic lines of uniquely marked strains. The genetics and characterization of these new transgenic lines will be presented, along with discussion of the utilization of transgenic insects in the NWS SIT Program.