To investigate the incidence of pesticide poisoning using serum cholinesterase activity patterns in a horticultural farm, 616 people comprising of 496 pesticide handlers (test group) and a control group of 120 persons participated in the study. A semi-structured questionnaire was used to obtain demographic information, while the activities of serum cholinesterase, serum glutamate oxaloacetate transaminase, serum glutamate pyruvate transaminase, alkaline phosphatase and bilirubin were estimated using standard commercial kits and absorbance measured using kinetic colorimetric tests. All the pesticide handlers (100%) were males, with majority (80.3%) aged 20 to 35 years old. Of the test population, 6% had significant cholinesterase enzyme depressions with no symptoms of exposure recorded. Significant difference ($p<0.05$) was observed in baseline cholinesterase activity between the test and control groups with a calculated intra-personal variation of 5.75%. Between the test and control groups, no correlation was observed on the baseline cholinesterase activity ($r^2 = 0.003$). Difference in cholinesterase activity was not significant ($p>0.05$) between the test and control groups based on years of handling pesticides. Use of pesticides in successive spray seasons significantly inhibited cholinesterase activity among the spray team, supervisors and harvesters ($p<0.05$). Higher cholinesterase activity was observed in the 31 to 40 age group with significant changes in cholinesterase activity ($p<0.05$) observed among those aged below 40 years. The study indicates that cholinesterase activity can be used effectively as an indicator of exposure to pesticides.