GA for optimizing Shekel's foxholes

I chose to program the GA using the C programming language to the gnu C99 standard. The program was compiled for a Linux system with make version 4.2.1 and gcc version 8.2.1.

To compile, type "make" into the source directory containing the file "Makefile".

To run the program, execute the file "main" (by typing "./main"). If you pass the commandline argument "0" (with "./main 0"), the program will use default values for population size, chromosone length and random seed.

The GA encodes the genes in decimal and uses the Island Model, where each chromosone is distinct and cross populate with other chromosones. Selection is done via tournament selection, where pairs of genes are selected at random to 'fight'. Either the least fit gene will be 'killed' or has a low chance of killing the fitter gene. The surviving genes then reproduce with crossover, and the cycle continues.

Crossover works by selecting each digit of the gene, then giving a probability of 0.495 to use the digit from gene a, and the same for gene b. This leaves a probability of 0.01 to 'mutate' the digit. The crossover will produce 2n genes from n input genes, as half of the population would have been killed from the tournament selection. This works by breeding the each gene with the next fittest, meaning each gene has bread twice.