Phylogenetic relations among the three species in grain amaranth need investigation to provide information for breeding experiments germplasm conservation efforts, and decision on evolutionary patterns in the grain types. Hybrid development from crosses between species was studied to find out genetic relationship between them. Interspecific crosses were made among *Amaranthus hypochondriacus, A. caudatus* and *A. cruentus* in the glasshouse. The F_1 plants were relatively easy to obtain but had low pollen fertility (10.3–15.1%) and low seed set. A few of these hybrids did not produce seeds. Only a few F_1 seeds obtained in crosses between *A. cruentus* and *A. caudatus*. All the F_1 plants from these crosses died at the seedling stage. Crosses between *A. cruentus* and *A. hypochondriacus* produced few seeds. Most of the F_1 plants obtained from the seeds died at the seedling stage with only four plants growing to maturity but were sterile. Based on hybrid development, it was suggested that *A. hypochondriacus* and *A. caudatus* were genetically closer than the other two combinations of species studied. *A. cruentus* seemed to be genetically closer to *A. hypochondriacus* than it was to *A. caudatus*.