

## **Rate of Cross-Pollination at Different Isolation Distances between Grain Amaranth (*Amaranthus hypochondriacus* L.) and a Weedy Relative in Zimbabwe**

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### **Abstract**

The adoption of grain amaranth (*Amaranthus hypochondriacus* L.) as a climate-smart crop due to its hardiness and drought escape mechanisms in sub-Saharan Africa is under threat from the lack of pure seed due to contamination by weedy relatives, such as pigweed (*A. hybridus* L.). Due to limited land availability, proper isolation distances to attain seed purity in the small-scale farming sector are impossible. A study investigating the cross-pollination rate between grain amaranth and pigweed at distances between 3 and 150 m was conducted at three sites in Zimbabwe during the 2020/2021 and 2021/2022 rainy seasons. Grain amaranth was planted at radial distances of 3 to 150 m from the pure pigweed plot. Meteorological conditions, such as temperature and wind speed and direction, were measured during the anthesis period. The cross-pollination rate in grain amaranth was influenced by distance from the pollen source. A maximum cross-pollination rate of 12.9% was observed within a 10 m radius from the pollen donor plot, and a minimum outcrossing rate of 0.45% was recorded at 150 m. The complete removal of weedy relatives within an extrapolated distance of 325 m is recommended to maintain the genetic purity of grain amaranth in small-scale farming systems.

**Keywords:** drought escape; contamination; pollen synchronisation; contamination rate; isolation distance; morphological marker