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Cowpea crosses in the field under  
semi-arid conditions in Botswana

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Cross pollinations of cowpea genotypes were conducted in the field at the Sebele Agricultural Research Center in Botswana, because suitable greenhouse facilities were not available. Selected genotypes were planted in an irrigated field and methods recommended by several cowpea breeders were used. However, most of the first several hundred cross-pollinated flowers dropped off the plants. More recent crosses were successful. We believe these successes were a result of several modifications that were made in the crossing procedure.

All crosses were made on plants growing in moist soil. The weather was hot and dry usually with a breeze. For the first crosses, which largely failed, newly opened flowers were collected from pollen parents 24 hr. before use and stored in polyethylene bags in a refrigerator at 10° C. Female flowers were emasculated the evening before they would normally have opened and were pollinated the following morning. Anthers from the refrigerated flowers were placed in small beakers and tapped with a small camel hair brush which was used to apply pollen to the stigmas. Pollen on the fingers or thumbnail was also used.

Because we surmised that exposed stigmas and/or pollen dried excessively before fertilization occurred, we decided to cover each pollinated flower and one or more of the adjacent leaves with a small polyethylene bag. This technique kept the flower moist and was useful in securing the bag to the plant. Secondly, we collected flowers from male plants early the same morning they were used in order to assure greater pollen viability. Thirdly, the stigma and anthers of male flowers were gently massaged before they were extruded from the keel of the flower onto a clean finger and thumb. The pollen covered stigma and the thumb and finger were used to pollinate the previously emasculated flowers. These procedures resulted in crosses that were successful in up to 80 percent of attempts with certain female genotypes. But some genotypes continued to fail both as male and as female parents.

We found that pollen obtained from drought stressed dryland plants produced fewer successful pollinations than pollen from irrigated plants. In general, field crosses were made rapidly and resulted in a large number of successful cross-pollinations. Overall, the success rate was 20%.