

Simple methods for storing soybean seeds in the tropics

Soybean (*Glycine max*) is one of the most important legumes in the world. AVRDC has promoted soybean and vegetable soybean production in the tropics through the introduction of improved varieties. A major constraint to soybean production is the rapid loss of its seed viability and vigor under ambient storage conditions. Germination rates drop precipitously after only two months of storage.

It is well known that mungbean and black gram store much better than soybean. These legumes' seeds are much smaller than those of soybean, particularly of vegetable soybean. It is assumed that bigger seeds of legumes are more difficult to dry during ordinary dehydration processing, especially during the hot-wet season. In turn, differences in the dehydration of seeds may alter seed viability and vigor after storage. The following experiment aimed to study this assumption, leading to the development of improved methods of soybean seed storage for poor farmers in the tropics.

Eight soybean varieties having different sizes of seeds were used. AGS-328, AGS-373, and AGS-292 have relatively large-sized seeds that weigh 34, 31, and 30 g/100 seeds, respectively. AGS-375, AGS-370, and TN3 have medium-sized seeds that weigh 21, 17, and 13 g/100 seeds, respectively. AGS-372 and AGS-190 have relatively small seeds that weigh only 11 and 9 g/100 seeds, respectively.

All varieties were sown on 26 November 2001 and harvested on 20 February 2002. The harvested pods were classified into two groups, yellow and brown pod color, for the purpose of separating maturity of seeds. Samples were collected immediately after solar drying and tested for moisture content and germination ability. The remaining seeds, approximately 200–300 g of each maturity and variety, were kept in a 1-liter capacity plastic box, which contained different desiccants at the bottom. Previous experiments showed no difference in seed moisture and germination among three different ratios of desiccants to seed in weight so this experiment used the same weight of desiccant to seeds for each container. The containers were sealed with plastic film to prevent entry of external moisture and kept in room temperature, 25–35°C. Seed moisture was checked by weighing 3–5 g seeds for each sample

before and after baking at 103°C for 16 hours. Germination was tested by placing 25 seeds per sample onto autoclaved and water-saturated sand in small plastic boxes and kept at room temperatures for 5–8 days.

Seed moisture contents after solar drying were higher among seeds in brown pods (10.99% as average of 8 varieties) compared to yellow pods (9.89%) and also among varieties. Average germination percentage of brown-podded seeds was much higher (91.3%) than those of yellow-podded ones (82.2%). In some varieties, seeds from yellow pods were 20–30% lower in germination than those from brown pods. The results indicate that only seeds in brown pods should be used for seed storage.

Seed moisture after storage in baked limestone was much lower compared to the other five seed drying treatments (ash, rice husk charcoal, baked salt, MgSO₄, control). Moisture was at 2% after one month of storage in baked limestone and gradually increased to 8% after 5 months. The values among the other five treatments ranged from 7.2 to 9.2%, however, plant ash and baked salt treatments showed lower moisture contents than the remaining three treatments.

Seeds stored with limestone consistently showed near 100% germination after six months irrespective of seed size. In other treatments, there were differences in germination ability related to seed size. Small-seeded varieties showed high percentages of germination even without desiccant for six months. In contrast, large- and medium-sized seeds showed lower germination percentage, varying between 60–80%. There was no clear relation between germination ability and seed moisture among the other five treatments.

These results suggest that quick seed drying is important to maintain seed viability for long period. The assumption that smaller seeds dry more easily and maintain their viability longer than larger seeds, was verified. This project will continue to check seed viability after long-term storage conditions and develop practical, large-scale methods through the use of baked limestone.

Contact: M. Suzuki