Speeding Up Release of New Peanut Varieties.

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Reducing the time taken from first cross to commercial release of new peanut varieties is a key objective of global peanut breeding programs. While modern gene technologies, such as molecular markers, often purport that breeding can be made more efficient and faster, it is still possible to significantly speed up the breeding process using novel but complementary conventional breeding approaches. We have developed new speed breeding techniques using controlled environmental conditions (CEC), incorporating controlled temperature and continuous light to significantly reduce generation time through accelerated plant development (e.g. 140 to 85 days). The continuous light system, which uses high intensity photosynthetic active radiation lamps, is also thought to select segregating lines for photoperiod insensitivity. A single seed descent breeding strategy was used to fast track the inbreeding process from a cross of a high yielding, rust susceptible parent (Farnsfield) with a highly rust tolerant parent (D147-p3-115). At the same time we used a glasshouse rust screening technique to phenotype segregating lines for rust tolerance/susceptibility in the F2, F3 and F4 generations. A population of Recombinant Inbred Lines (RILs) was developed in this CEC facility and the field, where plants were progressed from F2 to F5 in just over 12 months. A field trial subsequently evaluated these F5 generation RILs, where pod yield and rust tolerance were measured. Results suggest that the speed breeding and rust screening methods proposed in this study could be used within the context of an applied peanut breeding program. This breeding and selection system could potentially allow a time from ‘initial cross to commercial release’ of new varieties of only 5-6 years.