

developed cultivars of chickpea (*Cicer arietinum*). Journal of the Science of Food & Agriculture 55:37–46.

Williams, P.C., Nakoul, H., and Singh, K.B. 1983. Relationship between cooking time and some physical characteristics in chickpeas (*Cicer arietinum* L.) Journal of the Science of Food & Agriculture 34:492–496.

Variation in Globulin Proteins of Pulses

N Senthil, K Kalaiselvi, A Manickam,
S Palanisamy, and R Rathinasamy (Tamil
Nadu Agricultural University, Coimbatore
641 003, Tamil Nadu, India)

Legume globulin, or storage protein, is important in human diet because it contains essential amino acids. Most seed storage-protein studies available examine evolutionary and taxonomic relationships (Ladizinsky and Hymowitz 1979). In the present study, the components of major storage globulins are compared with respect to molecular weights between major and minor legumes.

Matured grains were ground to fine powder and extracted at 4°C in 0.01M Tris buffer (pH 7.2) with 0.5 M NaCl centrifuged, supernatant dialyzed against distilled water. The globulin fractions of major and minor legumes were characterized by SDS-PAGE (12%) following Laemmli (1970) and compared with standard molecular weight markers.

The globulin pattern of different pulses including chickpea and pigeonpea varied widely with respect to number, and molecular weight of polypeptides. Green gram (51 kD), black gram (49 kD), and cluster bean (41 kD) showed only a single major globulin. However, sword bean (51 and 33 kD), field bean (59 and 51 kD), cowpea (59 and 53 kD), chickpea (39 and 27 kD), garden bean (59 and 51 kD), and pigeonpea (40 and 27 kD) showed two major globulins each. Lima bean (27, 29, and 26 kD), and horse gram (56, 39, and 33 kD) showed three major globulin subunits. Soybean alone showed four major globulin subunits with molecular weights of 68, 46, 41, and 23 kD. However, a low molecular weight polypeptide of 23 kD was noticed only in soybean. Similarly, cluster bean has a low quantity of only one major globulin (51 kD). Hence, cluster bean is considered to be nutritionally poor in protein quality.

However, soybean, field bean, green gram, black gram, cowpea, and garden bean showed higher quantities of major storage globulins (58–41 kD range) when compared to other pulses. So, we can infer that the superi-

ority of the above pulses in nutritional quality may be due to the presence of 58–41 kD molecular weight globulins.

References

Ladizinsky, G., and Hymowitz, T. 1979. Seed protein electrophoresis in taxonomic and evolutionary studies. Theoretical and Applied Genetics 54:145–151.

Laemmli, U.K. 1970. Cleavage of structural proteins during the assembly of the head of bacteriophage T4. Nature 227:680–685.

A Potential Substitute for Agar in Microbiological Media

Y L Nene and V K Sheila (ICRISAT Asia
Center)

Agar is a complex polysaccharide extracted from marine algae and is extensively used in microbiological media all over the world. But it is expensive and not easily available in most developing countries. We, therefore, worked towards a cheap, easily available substitute for agar. We identified small-grained, granulated tapioca or tapioca pearls as a cheaper gelling agent, and a potential substitute for agar in microbiological media.

The procedures for the preparation of tapioca-based media are described by Nene and Sheila (1994). Two media, chickpea-dextrose-tapioca (CDT) [Chickpea *dhal* flour 5 g; dextrose 20 g; granulated tapioca (*Motidana*, no. 2 quality) 150 g; distilled water 1000 mL] and potato-dextrose-tapioca (PDT) [potatoes 200 g; dextrose 20 g; granulated tapioca (*Motidana*, no. 2 quality) 150 g; distilled water 1000 mL] were used for isolation, maintenance, and storage of several fungi from different taxonomic groups, and pathogens of five food crops.

Ascochyta rabiei, *Fusarium oxysporum* f. sp. *ciceri* (FOC), and *F. solani* were isolated from infected tissues of chickpea and *Alternaria alternata*, *F. udum*, and *Phytophthora drechsleri* f. sp. *cajani* (PDC) were isolated from infected tissues of pigeonpea. The six fungi were cultured on CDT, PDT, and PDA in petri dishes. Growth of the fungi on CDT and PDT were compared with that on PDA. In general, CDT and PDT supported as good growth of the fungi as did PDA (Fig. 1). Radial growth of *A. rabiei* was greater on CDT and PDT than on PDA (Fig. 2); however, fewer pycnidia and conidia were produced on CDT and PDT than on PDA. Conidial production of *A. alternata* was greater on PDT than on PDA. Mycelial growth of PDC was better on CDT and PDT than on PDA.

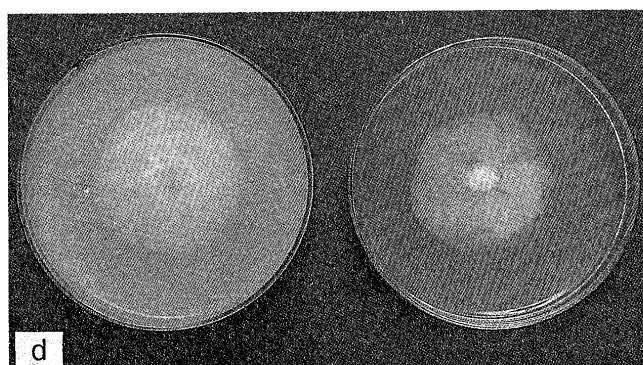
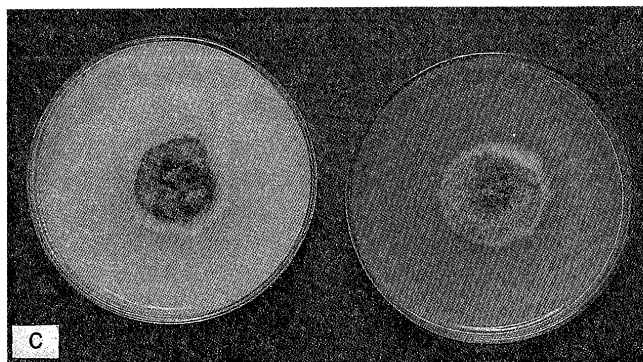
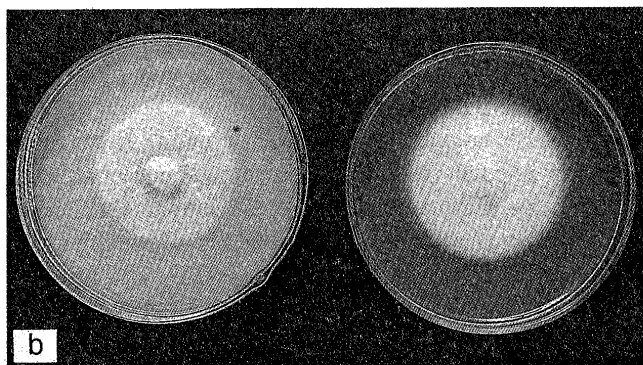
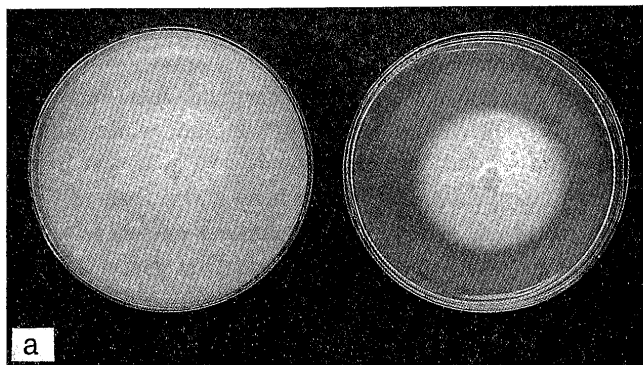


Figure 1. Growth of fungi after 4 days on potato-dextrose-tapioca (left) and potato-dextrose-agar (right): (a) *Fusarium oxysporum* f. sp. *ciceri*; (b) *Fusarium solani*; (c) *Alternaria alternata*; and (d) *Phytophthora drechsleri* f. sp. *cajani*.



Figure 2. Growth of *Ascochyta rabiei* after 15 days on chickpea-dextrose-tapioca (left) and potato-dextrose-agar (right).

Modified Czapek Dox medium (Singh and Chaube 1970) was used for selective isolation of *Fusarium* spp from soil. Vertisol samples from chickpea wilt-sick plot and Alfisol samples from pigeonpea wilt-sick plot were plated on modified Czapek Dox medium with agar or tapioca. White cottony colonies of *Fusarium* spp were isolated on both media—with agar and with tapioca (Fig. 3).

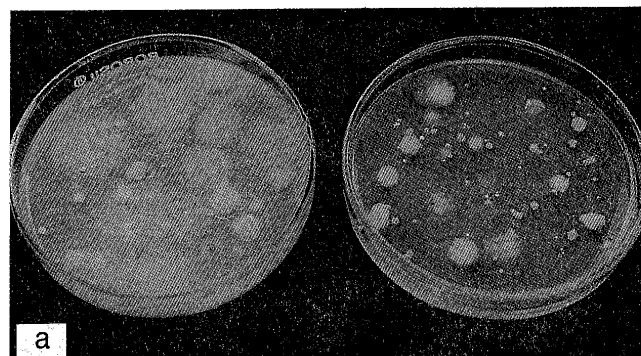


Figure 3. *Fusarium* spp isolated on modified Czapek Dox media with tapioca (left) and agar (right) from (a) Vertisol and (b) Alfisol.

Nene and Sheila (1994) reported for the first time the use of tapioca as a substitute for agar in microbiological media. Tapioca-based media can be used not only for routine culture of fungi but also in seed pathology, selective isolation of fungi, and evaluation of fungicides. Attempts are being made to replace agar with granulated tapioca in tissue culture media for callus initiation of chickpea and pigeonpea.

References

Nene, Y.L., and Sheila, V.K. 1994. A potential substitute for agar in routine cultural work on fungi and bacteria. *Indian Journal of Mycology and Plant Pathology* 24:159–163.

Singh, R.S., and Chaube, H.S. 1970. A technique for estimation of hyphal and conidial propagules of *Fusarium* species in soil. *Labdev Journal of Science and Technology* 8:172–174.

Pigeonpea

Socioeconomics

Adoption of Maruti (ICP 8863) – A Case Study

T G Shanower, T G Kelley, Y Mohan Rao, and M A Ghaffar (ICRISAT Asia Center)

Maruti (ICP 8863) is a medium duration, wilt resistant pigeonpea cultivar, originally released for cultivation in Karnataka, India, in 1986, but now widely grown in the core pigeonpea production zone of south India (REIA 1994). Farmers' pest management practices and perceptions were surveyed in this region as part of an on-farm pest management project. Several interesting insights about Maruti and why it has been so widely adopted emerged from these surveys.

The surveys were conducted in Marepalle village, 16 km from the town of Tandur in Ranga Reddy District, Andhra Pradesh. The village is located within the large pigeonpea producing region of northern Karnataka, southern Maharashtra and western Andhra Pradesh. Thirty-four of the 289 households listed in the Revenue Office records for Marepalle were selected for the study.

The sample included a cross-section of small and large farmers. Detailed results of the survey are currently under preparation.

Prior to 1988, farmers in Marepalle grew only two pigeonpea cultivars, one red and the other white-seeded. The white-seeded cultivar (probably BDN-1) was by far the most popular. It was grown by more than 90% of farmers with 41% growing this cultivar exclusively, and the rest growing both cultivars. In earlier years, the red-seeded cultivar was more commonly grown but farmers shifted from red- to white-seeded cultivars because of higher yield, larger grain size, and a higher market price. Traders and dhal mill owners pay a premium price for large, white-seeded pigeonpea because this produces a brighter dhal which can be sold at a higher price (Parthasarathy Rao et al. 1991).

Currently, no one in Marepalle is growing either of the formerly popular cultivars. These have been completely replaced by Maruti, first introduced into this village in 1988. Maruti was quickly adopted and is now being grown by 100% of the farmers in this village (Fig. 1). This demonstrates that farmers in the semi-arid tropics are not averse to change and will quickly adopt new technology, provided the technology has clearly perceptible benefits and is not overly risky.

Interestingly, Maruti replaced previously grown cultivars even though one of them, the white-seeded pigeonpea, had several preferred qualities (Table 1). Almost half of the farmers (42%) said the white-seeded cultivar has higher yield potential than Maruti. More than 80% of the respondents (60% of females and 46% of males) prefer-

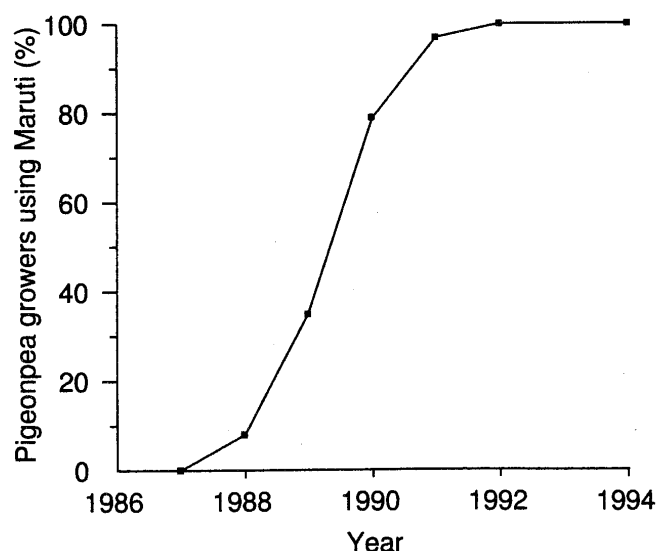


Figure 1. Adoption of Maruti (ICP 8863) pigeonpea cultivar in Marepalle village, Andhra Pradesh, India.