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After potato, tomato is the most important vegetable crop in India, nay in the world. Both non-hybrid and hybrid tomatoes are in cultivation with the former accounting for bulk of the production. Many of the commonly cultivated non-hybrid tomato varieties are old, some of them date back to pre- and post second world war. Breeders' seeds of such old tomato cultivars are difficult to come by. Seed farms marketing such old tomato cultivars have got their own foundation seeds, usually selections made by them much earlier from their seed stocks and after multiplication still continue to market them.

in order to identify the commonly cultivated tomato cultivars of Eastern India, authentic seeds of eight registered tomato cultivars (Marglobe Supreme, Pusa Ruby, Pusa Early Dwarf, Roma, Oxheart, Moneymaker, Punjab Chuhara and Best of All) were obtained from Sutton & Sons, a leading seed farm and one non-registered cultivar, Perfection from Amtala Seed Stores, 24-Parganas (South), West Bengal, India.

Identification at the cultivar level of the different tomato seed material was attempted at morphological (including grow out studies in both field and pots as well as scanning electron microscopy of seed and leaf surfaces), physiological (through seed germination under moisture and salinity stresses) and biochemical (through polyacrylamide gel electrophoresis of seed proteins) levels and the salient findings are listed below.

(1) Morphological studies :

On the basis of nature of growth, the cultivars could be divided into two groups - '(a) determinate type (cvs Pusa Early Dwarf, Roma and Punjab Chuhara) and '(b) indeterminate type (cvs Marglobe Supreme, Pusa Ruby, Roma, Perfection, Moneymaker, Punjab Chuhara and Best of All).

Among the qualitative and quantitative morphological data collected, qualitative data pertaining to leaf and fruit characters proved most helpful in demarcating cultivars.

The cultivar Roma stood out from others in having 5 leaflets while the rest of the cultivars had 7 leaflets. All the cultivars with 7 leaflets could further be subdivided into 4 groups on the basis of leaflet arrangement - '(a) paired opposite bottom leaflets (Pusa Ruby and Best of All), '(b) almost unpaired bottom leaflets (Marglobe Supreme, Perfection, Oxheart and Moneymaker), '(c) bottom leaflets unpaired and rest paired (Punjab Chuhara) and '(d) bottom leaflets conspicuously unpaired (Pusa Early Dwarf).

The cultivars within the above subgroups could however by clearly distinguished on the basis of folliole arrangement on the petiole and petiolules. Apical leaflet tip could once again lead to clustering of the cultivars into three groups on the basis of whether the tip was acute, acuminate or between acute and acuminate. There were other distinct varietal traits.

Fruit characteristics proved to be of great value in demarcating culti-vars. Heart shaped fruits alone could separate Oxheart from other. The cultivars Roma and Punjab Chuhara paired out themselves in having pear shaped fruits. Size, shape, colour, presence or absence of ribs and shoulders, pulp characters - whether juicy or firm, number of locules/fruit, number of seeds etc. led to complete separation of the cultivars under study.

Quantitative data pertaining to plant height, girth, number of internodes, internode lengths, leaf numbers, leaf growth rate, first flowering date, 50% flowering date, nodes first flowered, number of flowers/inflorescence, branches/inflorescence etc. provided additional information in distinguishing the cultivars especially when the quantitative data were transformed into qualitative ones on an arbitrary basis.

Agronomic data involving yield, response of the cultivars to various nitrogen levels, dry matter producrtion, N, P, K uptake, N-use effi-ciency clearly reflected the varietal peculiarities and as such helped to a great extent in cultivar identification.

Scanning electron microscopy of seeds showed various shapes - pear shaped (cvs Marglobe Supreme and Pusa Ruby), ovoid (cvs Oxheart and Moneymaker), elongated (cv Roma), oblong (cv Punjab Chuhara), elliptic oblong (cv Pusa Early Dwarf), pyriform (cv Perfection) and ovoid pyriform (cv Best of All). In hair characters on the seed surface, there was some differences. Seed surface hairs of cv Pusa Ruby were

unique in the sense that they were dorsally keeled. Hairs of other cultivars were in the main centrally keeled.

SEM study of leaf surface did not reveal any difference in stomatal shape - it was uniformly cruciferous. Leaf surface hairs were found to be of two types - (a) multicellular trichomes tapering towards the tip (cvs Marglobe Supreme, Pusa Ruby, Pusa Early Dwarf, Roma, Perfection and Best of All) and (b) multicellular trichomes whose basal cells formed a distinct collar like structure (cvs Oxheart, Money-maker and Punjab Chuhara).

(2) Physiological studies :

Seed germination was adversely affected by increasing moisture and salinity stresses in all the cultivars but distinct varietal difference in stress tolerance was noted. The cultivar Pusa Early Dwarf showed highest tolerance of both moisture and salinity stresses. Other cultivars which showed quite high degree of stress tolerance at the germination phase were Pusa Ruby and Perfection. The cultivar Punjab Chuhara proved most susceptible to the twin stresses of high moisture deficit and salinity.

It appears that unlike morphological study which could lead to complete identification of the cultivars studied, here the scope is rather limited since this could only lead to distinguishing some of the cultivars of tomato.

(3) **Biochemical studies based on PAGE :**

PAGE of Tris-HCl seed protein extract led to detection of 38 protein bands. The number of protein bands in the different cultivars varied - the highest number was 11 (cvs Marglobe Supreme, Pusa Ruby, Pusa Early Dwarf and Moneymaker) and the lowest was 6 (cv Perfection).

The protein bands unique for the different cultivars were 16, 26 and 41 for Marglobe Supreme, 8 and 12 for Pusa Early Dwarf, 1 for Roma, 21, 23 and 38 for Perfection, 11 and 29 for Oxheart, 2, 15 and 18 for Moneymaker and 47 for Punjab Chuhara. The cultivar Best of All had no characteristic protein band of its own but was distinct from others in having protein bands only in the low (bands 5, 9, 14) and high (bands 32, 33, 34, 35) mobility regions with no protein band in between.

On aging, however, the protein bands were found to change with some bands getting totally obliterated and appearance of completely new bands. Under different levels of nitrogen too seed protein banding pattern underwent great change in all the cultivars.

It appears that seed protein banding pattern is affected by cultivation and storage conditions in tomato and as such holds out limited promise for use as a tool in tomato cultivar identification.