

Quality breeding in bulbous vegetables

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Introduction

Quality refers to the suitability or fitness of an economic plant product in relation to its end use. Quality is the degree of excellence for a specific use or to serve a specific purpose. A trait that defines some aspect of produce quality is called quality trait (Singh, 2016).

Bulb crops are important vegetables known for their nutritional, therapeutic, medicinal and processing qualities. Quality improvement is an important component in nutritional security; it is of prime importance for the consumers and processing industries. Therefore, improving quality through suitable breeding approach is an important task.

Classification of quality traits:

- 1. Morphological Quality Traits:** It is related to produce appearance. It includes size, shape, surface and colour of produce. It is easily observable. It has main role in determining consumer acceptance of the produce.
- 2. Organoleptic Quality Traits:** It is related to palatability of the produce. It includes taste, aroma, smell, juiciness, softness. It is easily detected. It is important in influencing consumer preferences.
- 3. Nutritional Quality Traits:** It determines the value of produce in human nutrition. It includes protein, oil, vitamin and mineral content also the presence of anti-nutritional factors. It is not easily detectable but important in determining the human health.

4. Biological Quality Traits: It is actual usefulness of the produce. It includes protein efficiency ratio, biological value, body weight gain. It is valuable in determining the utility of produce for consumption.

5. Undesirable Traits: Doubles/splitters, sprouting, bolting (Singh, 2016).

Breeding approaches to improve the quality:

Genetic variability is an important prerequisite for improvement of a crop.

- Clonal selection
- Mass selection
- Recurrent selection
- Hybridization
- Biotechnological applications (Ram, 2012)

ONION:

- It is one of the important bulb vegetable.
- Rich source of vitamin C, iron, phosphorous, calcium and fructans
- Pungency-allyl propyl disulphide
- Red colour varieties are more pungent followed by brown, yellow and white.
- It contains different pigments and they are responsible for different colours viz.,

Red-anthocyanin

Yellow-querectin

Quality parameters:

- Longer bulb storage life
- Single centered bulbs
- Bulb shape, colour and size varies according to consumers preference
- Pungency and TSS
- Firm bulbs
- Free from splitters and bolters
- Dormancy- to extend the storage life
- High antioxidants

Quality parameters for dehydration:

- Pure white globose shaped bulbs (5-7.5 cm diameter)

- Small and tight necked with short root zone
- Thin neck
- Single centered bulbs
- Low ratio of reducing to non-reducing sugars
- High pungency and TSS (15-20%)
- Drying ratio (6:1)
- Wider seasonal adaptability
- Long storage capacity
- Not less than 80% moisture
- Resistant to storage pests and diseases
- Free from greening

Quality parameters for export:

- Bigger sized bulbs (>60 mm diameter)
- Single centered bulbs
- Less pungency
- High TSS
- Uniform in shape, size and colour
- Free from splitters and bolters (Ram, 2012)

Genetics:

Table: 1

Character	Gene symbol
Bulb colour	
Red	ii, CC, RR ii, Cc, RR ii, CC, Rr ii, Cc, Rr
Yellow	ii, CC, rr ii, Cc, rr
White	ii, cc, RR ii, cc, rr ii, cc,Rr II,--,-- Ii,--,--
Bulb size (weight, diameter)	Polygenes and additive gene action
Dry matter content	Poly genes, additive gene action
Bulb shape	non additive gene action
TSS	non additive gene action

GARLIC:

- It has higher nutritive value than other bulb vegetables.
- Rich source of carbohydrates, protein, vitamin C, thiamin, riboflavin, calcium and phosphorous.
- Flavour-diallyl disulphide
- It consists of a compound called alliin.

Quality parameters:

- Longer bulb storage life
- Larger bulb size
- White coloured bulbs
- High pungency
- Firm bulbs with compact cloves
- Free from splitters and bolters
- High dry matter and TSS (Ram, 2012)

Conclusion:

Breeding for quality improvement provide more consumer acceptance and satisfaction which in turn enable producer to get good return. Nutritional improvement along with yield is important to combat micronutrient deficiency and malnutrition. There are cultivars developed in bulb vegetables for quality attributes viz., dehydration purpose (Pusa White Flat and Arka Yojith), export purpose (Arka Pitamber and Arka Sona) in onion and Agrifound Parvathi and Yamuna Safed-1 in garlic. In future more emphasis must be given for multi-nutrient rich variety and also to have more quality attributes in one variety along with yield.

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