



Pure line Selection

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Pure-line selection

- Pure line is a self pollinated descendent of a self pollinated plant.
- Desirable types already exist in population.
- Those are isolated through careful testing procedures.
- Another term used for this method of plant breeding is *individual plant selection*, as large numbers of plants are selected, but those are harvested individually, their individual progenies are grown and evaluated and then best progeny is released as a pureline variety.
- Pureline varieties are *homozygous* and *homogeneous* as they are *genetically similar* and true breeding.
- Such varieties possess *narrow genetic base* so they are more susceptible to diseases, and have poor adaptability.

Procedure

Pure-line selection generally involves three more or less distinct steps:

- (1) numerous superior appearing plants are selected from a genetically variable population;
- (2) progenies of the individual plant selections are grown and evaluated by simple observation, frequently over a period of several years; and
- (3) when selection can no longer be made on the basis of observation alone, extensive trials are undertaken, involving careful measurements to determine whether the remaining selections are superior in yielding ability and other aspects of performance.

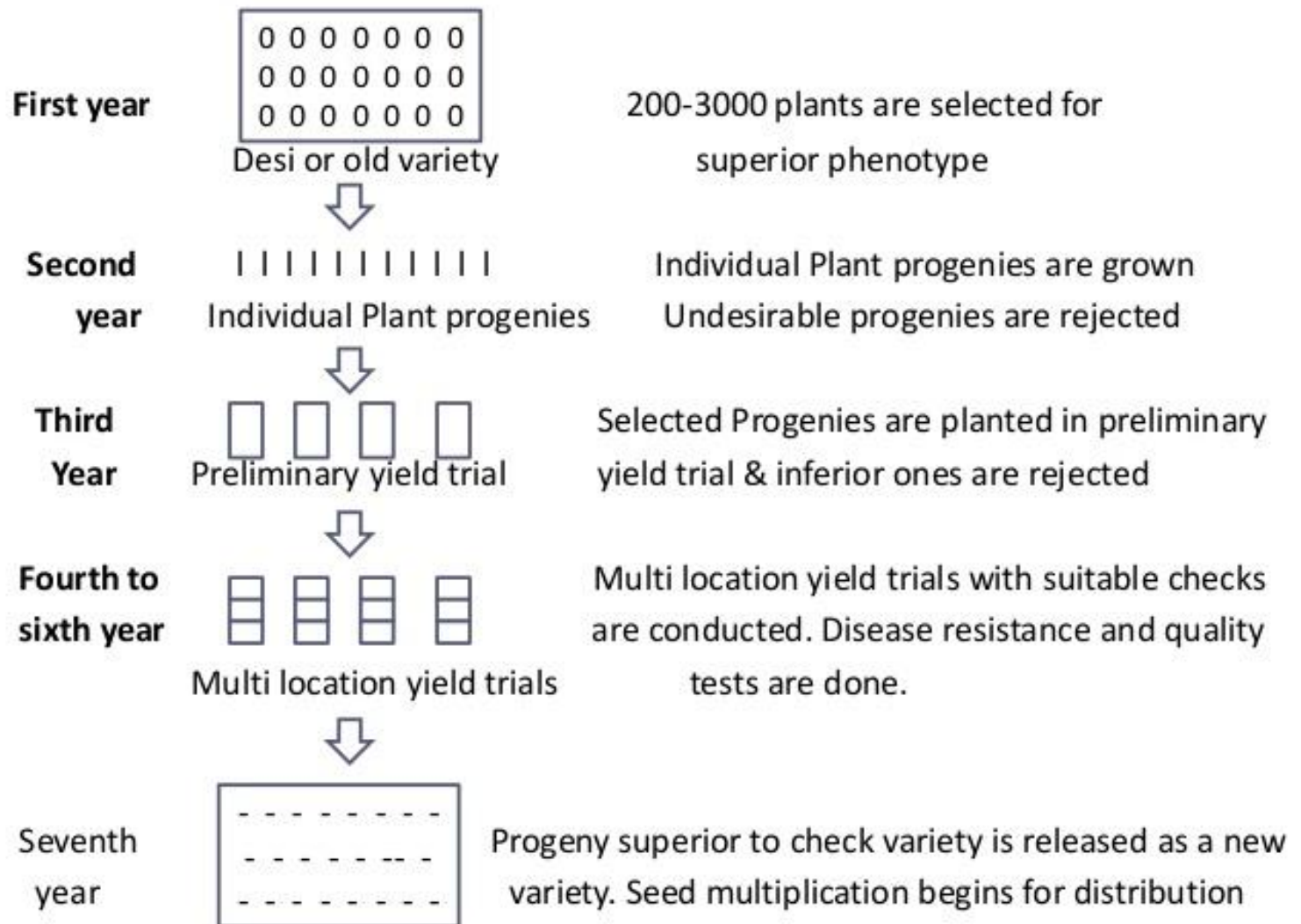
Steps

➤ Select desirable plants

- Number depends on variation of original population, space and resources for following year progeny tests
- Selecting too few plants may risk losing superior genetic variation
- A genotype missed early is lost forever

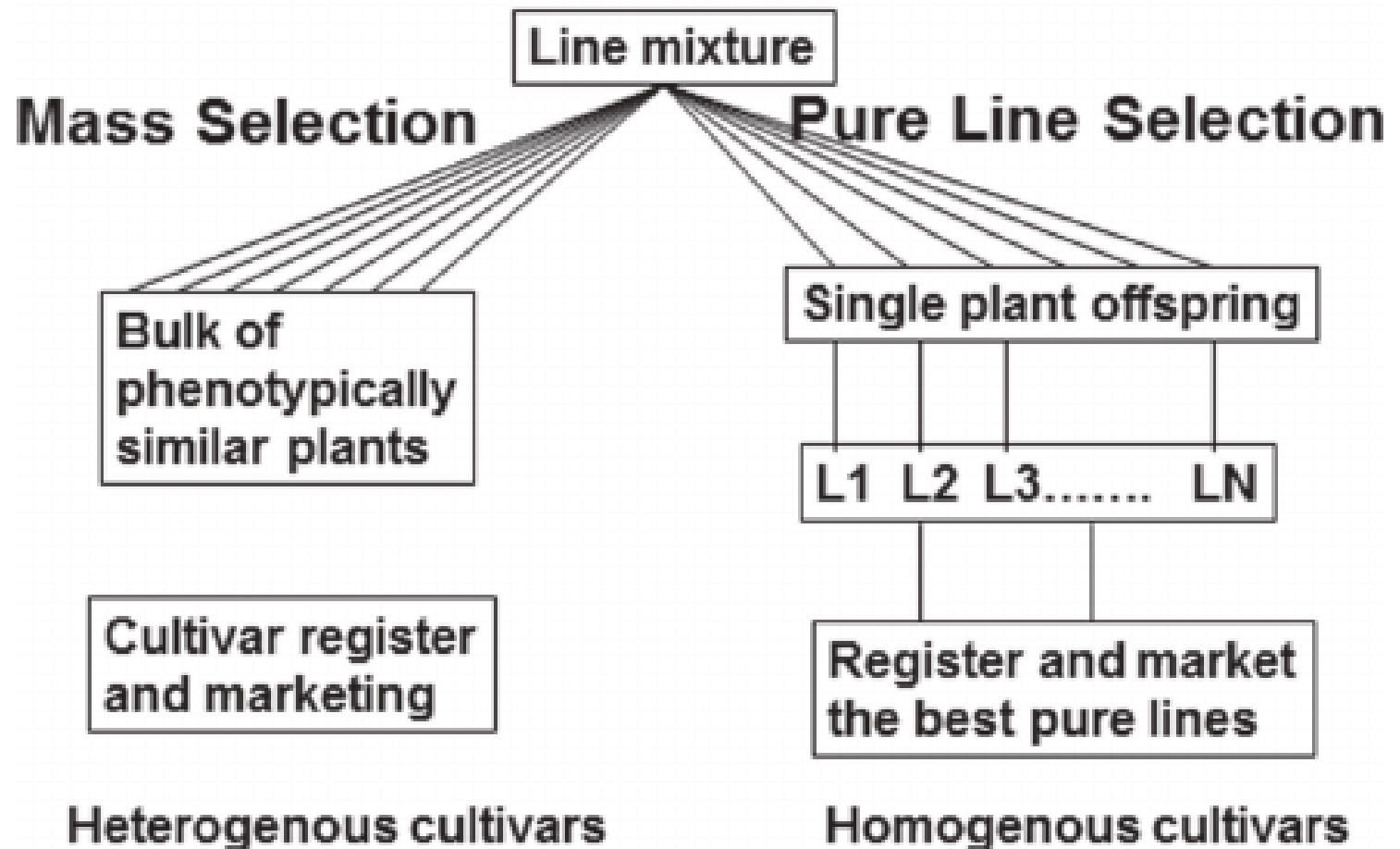
➤ Seed from each selection is harvested individually

- **Single plant progeny rows grown out**
 - Evaluate for desirable traits and uniformity
 - Should use severe selection criteria (rogue out all poor, unpromising and variable progenies)
- **Selected progenies are harvested individually**
- **In subsequent years, run replicated yield trials with selection of highest yielding plants**
- **After 4-6 rounds, highest yielding plant is put forward as a new cultivar**



Pure Line selection

Mass Selection vs. Pure Line Selection



Differences between the mass selection and pure line selection.

S.No.	Particulars	Mass selection	Pure line selection
1.	Nature	More of an art than a science	More of science than an art
2.	History	As old as agriculture itself	Not so old as is mass selection
3.	Number of plants selected in first year	Large	Lesser
4.	Procedure	Selected plants is mixed together and sown as much in the next year	Selected plants are kept separate and the progenies of each plant is sown separately in an individual row in the next year.
5.	Testing of Progeny	Not carried out	Progeny as well as the individual performance is tested
6.	Control over pollination	No control	Controlled
7.	Type of developed variety	Heterozygous and deteriorates very quickly due to heterozygosity and cross pollination	Homozygous and is, therefore, more lasting
8.	Repetition of process	Every year to maintain the purity	No need to repeat every year
9.	Adaptability	Suited to large areas under varying environmental conditions	Not suited, adapted to a limed region.
10.	Time taken	About 8 years	About 10 years.

Advantages and Disadvantages of Pure Line Selection

Advantages of Pure Line Selection

- Easy and cheap method of crop improvement.
- Rapid method, lines are usually genetically fixed and yield trials can be immediately conducted.
- Poor plants are eliminated. Maximum genetic gain is reflected.
- Plants in such variety react in similar fashion to environmental conditions, means they are uniform in performance and at the same time in appearance too.
- Maximum possible improvement over the original variety can be achieved.
- Useful in improving low heritability traits as selection is based on progeny performance

Disadvantages of Pure Line Selection

- Pure lines have poor adaptability due to narrow genetic base, just opposite to mass selected variety.
- Superior genotypes can only be isolated from the mixed population. This selection is powerless to bring changes in hereditary factors i.e. to develop new genotype.
- Mostly popular or in fact limited to self pollinated spp. only.
- Time, space and resource consuming.
- More expensive yield trials have to be conducted than in mass selection

Achievements of Pure Line Selection

Crop	Variety / Hybrid	Origin	Year of release	Yield Kg/ha	Duration in days	Special features
Cotton	C 7	Pure line selection from local variety	1925	112	210	Fibre length 21 mm, GOT 30, Spinnability 24
Cotton	CO 2	Selection from Co 1	1929	950	195	Mean fibre length 22.0 mm
Cotton	K 1	Pure line selection from C7	1935	350	210	Fibre length 22 mm, GOT 30, Spinnability 24
Andrographis paniculata (kalmegh)	RVK 1	Pure line selection from genetic stock (Kondagaun Chattisgarh)	-	3140 kg/ha in rain fed; 5500-6000 kg/ha in irrigated condition	150-180	Suitable for three cuttings. Recommended for Kalmegh growing areas of M.P.



RCDL-10 Dolichos bean (*Dolichos lablab*)

- ☐ A photoinsensitive, bush type pure line selection.
- ☐ Sown from April to September at a spacing of 80x 40 cm.
- ☐ Harvesting starts after 75 days of sowing.
- ☐ Green pod yield 140-150 q / ha.
- ☐ Tolerant to aphids, leaf spot and powdery mildew.



**Aiden Gardens: A Pure line Selection from IIHR Tomato Arka
Abha 100 Seeds.**



MDU (Ko) 1: *Tephrosia purpurea* (Wild indigo or Kolingi)

Parentage	: Pureline selection from Thaniparai local of Western ghats
Duration	: Green manure : 65 - 70 days
Seed	: 120-150 days
Season	: Summer
Yield	: Biomass :9000 kg / ha (70% increase over local type)
Seed	: 100-150kg/ha
Highest yield	: Green manure: 9974kg/ha
Area of adoption	: All the districts of Tamil Nadu

Thank you