

Role of DUS testing in registration of plant varieties under PPV & FR Act, 2001

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The government of India enacted a legislation system for the protection of plant varieties called PPV & FR Act, 2001. This Act provide legal protection of new varieties, right of breeders, researcher, farmer and encourage the development of growth of seed industry and provide the new varieties with economic value which are used for breeding programme. Under this Act field crops could be protected for a minimum period of 15 years whereas, forest trees, fruit trees, ornamental trees, shrubs and protected for 18 years. So under this Act a Authority was established in 2005 in New Delhi having one chairmen and 15 members. Branch office of this Authority is ranchi and Gohawati. It also maintain a register in which information of all registered varieties are kept called national register.

Right merged under PPV and FR Act, 2001 :

- Breeders, right means varieties which are developed by breeder can be used as breeding purpose and they can sell and distribute their produce seed.
- Researcher right mean use the varieties as a initial source for the development of new varieties
- Farmer Right means who can sow, resow, sell, exchange their farm seeds under this Act.

DUS testing is implementation of PPV&FR and started in 2007with twelve crops. First DUS testing of the new/candidate varieties was started at DRR for rice variety.

DUS testing is useful for identification of varieties, registration of varieties and plant variety protection (PVP) Act, for varietal information system and classification of varieties into different groups, and for genetic resources. PPV&FR Act, 2001 gave the legal protection if varieties meet the DUS criteria means it should be new, distinct, uniform and stable.

DUS guideline and testing centre was prepared by Authority which was crop specific. The centres were designed where agro climatic conditions are suitable for growth of crops example in case of rice nodal centre is DRR and co nodal centre CRRI, nodal centre of wheat is DWR and in cotton, four DUS testing centres, viz., Nagpur,

Coimbatore, Dharwad and Hisar have been decided. DUS testing is conducted at least two location and two growing season *Rabi* and *Kharif*. If variety failed to show their characteristics test should be conducted in another location.

Criteria for registration of plant varieties :

- **Distinctness:** The new variety must be clearly distinguishable in one or more characters from previously available varieties. It may differ in morphological quality, agronomic or any other character
- Uniformity means variety must be sufficiently uniform in its relevant characteristics, subject to the variation that may be expected from the particular features of its propagation, it should be pure and look phenotypically similar. The assessment of uniformity of characteristics on the plot as a whole. In the case of 400 plants sample, the maximum number of off-types would be two.
- **Stability:** means essential characters remain unchanged under different agro-climatic conditions.
- **Novelty:** It refers to newness of a variety.

The material for testing include new, extant, farmer and essentially derived varieties. Sample size may be specific for each crop in case of rice 3000 grams seed or hybrid seed whereas for parental line 1500 gram each parental required.

Table 1 : The test plot design

	Rice	Cotton
Number of rows	30	5
Row length	6 m	6 m
Row to row distance	30 cm	90 cm
Plant to plant distance	20 cm	60 cm
Number of replications	3	4

In this there are two varieties are taken for examination of characters one example varieties and other candidate varieties. Example varieties are used for the comparison and candidate varieties that are protected. Characteristics can be taken on the basis of morphological, biochemical and molecular marker.

Morphological can be quantitative and qualitative such

as shape, size height etc. Biochemical includes electrophoresis of protein and isozyme analysis whereas in molecular RAPD, SSR, etc. primers are used identification of uniformity, stability and distinctness.

Method of observation : There are two method of observation :

- Visual observation made on the basis of expert's judgement, usually in comparison to a reference point and includes all sensory observations (sight, smell, taste, touch). It is quicker and cheaper than measurements for example stem colouration.

- Measurement observation can be observed by using linear scale e.g. ruler, weighing scales, colorimeter, dates, counts, etc. it gives numerical value often with units e.g. cm, gram, days.

Type of records :

- **MG** – Single measurement of a group of plants or parts of plants.

- **MS** – Measurement of a number of individual plants or parts of plants.

- **VG** – Visual assessment by a single observation of a group of plants or parts of plants.

- **VS** – Visual assessment by observation of individual plants or parts of plants.

When a method of observation is attributed to a certain characteristic, the first differentiation is made on the basis of action taken either visual observation (V) or a measurement (M). The second differentiation deals with the number of observations the expert attributes to each variety, thus the attribution of either G or S. If a single observation of a group consisting of an undefined number of individual plants is appropriate to assess the expression of a variety, this type of record expressed either VG or MG. Example measurement of plant length on a plot (MG), green colour of leaves on a plot (VG).

Observation on a number of individual plants that

assess the expression of a variety could be expressed by S (thus either VS or MS). For example measurement of length of ears (MS), and growth habit of single plants in grasses (VS).

Colour characteristics, can be assessed with the help of Royal Horticultural Society Colour Chart.

Grouping of varieties : The candidate varieties for DUS testing shall be divided into groups to facilitate the assessment of distinctness. Some characteristics are proposed to be used for grouping in case rice varieties such as basal leaf, sheath colour, time of heading and content of amylase etc.

DUS test design : The use of experimental design with respect to the number of growing cycles, lay out of the trial, number of plants to be examined and method of observation is largely determined by the number and nature of varieties to be examined in a particular trial. In DUS trials, because of the presence of only one treatment factor (variety), the following designs are used.

- **Completely Randomised Design :** This design was applied if total number of test varieties is small.

- **Randomised Complete Block Design :** When number of plots per block equals the number of varieties and all varieties are placed in each block this design is used. The advantage is that standard deviation between plots does not contain variation due to difference in blocks.

- **Randomised incomplete Block Design :** In case of large number of varieties. Here, the number of plots per block is less than the number of varieties this type of design used.

Conclusion : DUS testing has an imperative role before registration of plant varieties under PPV&FRA that providing an opportunity for the legal protection of plant varieties, diversification of agriculture and overall growth of agriculture.

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