



### **Beushening: A Traditional Method of Rice Crop Establishment in Eastern India**

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*Beushening*, commonly practiced in submerged lowlands of eastern India, is a traditional cultural practice of cross-ploughing the dry-seeded (broadcast) standing crop of rice 25-35 days after seeding when 15-20 cm of rainwater gets impounded in rice fields, followed by laddering and seedling redistribution which facilitates stable rice yields under low levels of inputs and uncertain climatic conditions.

#### **Beushening**

Rainfed lowland rice occupies an important position in the agriculture of eastern India, which comprises the states of Assam, Bihar, Orissa, West Bengal, and the eastern parts of Madhya Pradesh and Uttar Pradesh. Eastern India accounts for 58% of the total rice area in the country but less than 48% of national rice production. In the rainfed lowland areas of eastern India with shallow and intermediate water, *beushening* is popular among farmers in about 50–80% of the area (Nayak and Lenka, 1988) because they obtain stable yields with limited labour, cash, and inputs under an uncertain water supply. Locally, this practice is known as *beushen* in Orissa and Bihar, *biasi* in eastern Madhya Pradesh, *lev* in eastern Uttar Pradesh, and *baug* or *bidauni* in Bihar (Singh *et al.*, 1994). It is practiced by resource poor farmers under risk-prone environments with highly variable climate.

*Beushening* is a traditional rice cultivation system, common throughout the rainfed regions of eastern India. *Beushening* facilitates stable rice yields under low levels of inputs and uncertain climatic conditions through effective weed control, stimulated root growth and optimum plant stand with enhanced tillering. Rice cultivars mostly used in *beushening* are of local origin with maturity duration of 150- 170 days and medium tillering capacity. Improved varieties are rarely used for *beushening*.

*Beushening* involves two broad series of field operations:

1. Direct seeding of mostly traditional tall rice cultivars using higher seed rates than those used for direct seeding without *beushening*; or
2. Wet ploughing and laddering of the field, generally 25-35 days after germination of the rice, when about 15 cm of rainwater is accumulated in the crop field. In some cases, seedling redistribution is also done after this operation.

### The *Beushening* Process

- The fields to be beushened are ploughed immediately after the winter or summer rain and 2-3 times thereafter during summer to control weeds, insects and rodents. Ploughing is done by an animal drawn wooden plough, without inverting the soil.
- If weeds are observed after the first monsoon rain, additional ploughings are done to suppress them.
- Rice seeds are then broadcasted in the dry soil and mixed by harrowing in the last week of May.
- Farmers had experienced that sowing in May resulted in higher grain and straw yields because the crop matured before the occurrence of late season drought in early to mid-October.
- Wet ploughing is done 25-35 days after germination, but only after having 15-20 cm of standing water in the rice field.
- Farmers let their cattle graze rice seedlings one week before ploughing to de-top seedlings to improve tillering and maintain optimum plant population. They also use the crop foliage as fodder which otherwise would be lost during ploughing and laddering.
- Rice fields are ploughed, followed by one or two laddering with 15-20 kg of load (usual plough load) on the ladder, to only break the “soil slice” and loosen it without damaging rice plants.

- Farmers observe weed conditions in fields for 2-3 days after laddering. If weeds were not well incorporated into the soil, farmers repeat laddering.
- Two to three laddering are generally sufficient to damage and incorporate the weeds, especially *Echinochloa colona* (*jhimpa* or *jharua*), which was difficult to distinguish from the rice plant.
- Seedling redistribution is done to fill up blank patches and thin out the dense patches caused by repeated laddering.

### Farmers’ Reasons for *Beushening*

**Labour requirement:** Labour saving in *beushening* is mainly in nursery growing, land preparation, transplanting and weeding operations. As the operations in *beushening*, especially land preparation, wet ploughing and hand weeding, are done over a longer period of time, the labour demand for these operations could be spread over time. A total of 130 mandays/ha are required in the various operations of *beushening* versus 209 mandays/ha in the transplanting system. The *beushening* system also uses less animal power (42 days/ha) than the transplanting system (50 days/ha).

**Low fertilizer requirement:** Farmers in *beushening* rice farming use traditional tall cultivars which require minimum fertilizer and do not respond economically to higher doses. According to farmers, high-yielding varieties (HYVs) require high purchased inputs and are not suited for *beushening*. Farmers also avoid

HYVs for transplanting because of their inability to invest in more fertilizers.

**Beushening does not require a nursery:**

Owing to a shortage of water and the problem of stray animals during summer months, it is difficult to raise seedlings in a nursery. This also saves farmers substantial labour cost.

**Puddling is not required:** Farmers have to wait for enough water to accumulate for puddling, which, even in normal years of rainfall, is possible only in mid- to late July. Therefore, by transplanting, crop establishment is not only delayed but also suffers from drought in mid-October, near flowering time. Beushened fields, on the other hand, which already contain a crop as a result of sowing in May, could hold water like a puddled field.

**Less pest problems:** As the fields to be beushened are repeatedly ploughed during summer, these fields reduce rodent and weed problems, because summer ploughing destroys rodent burrows and uproots weeds, which are dried up in the summer heat. The remaining weeds are buried in the mud during wet ploughing and laddering, done 25-35 days after germination.

**Less cash inputs required:** Besides not having nurseries and puddling operations, *beushening* also requires no additional expenses for fertilizers. Moreover, because labour requirements are spread over a longer period of time, most operations in *beushening* are done by family labour. In then transplanting system, hired labour is needed as most of the operations

up to transplanting have to be done within about a month. *Beushening* is therefore a cost-saving strategy.

**Beushening is an appropriate alternative in drought and submergence prone areas:**

Transplanted or direct-seeded rice cultivation in drought- and submergence-prone areas is not economically feasible because of erratic rainfall and undulating topography. Depending on the rainfall, the crop is likely to suffer from drought or floods or both, sometimes even in the same season. The timeliness of transplanting is crucial because, with progressive delays in transplanting, the seedlings become older. This results in a lower number of tillers and the crop faces a greater risk of water shortage and low-temperature injury at the reproductive stage in mid-November and early December.

**Ease and timely establishment of non-rice crops:**

In clay soils, several years of puddling for transplanting reduced rice yields and created difficulty in establishing subsequent non-rice crop because of soil compaction. Transplanted rice was harvested 2-3 weeks later than beushened rice, subsequent non-rice crops in transplanted fields also suffered from soil moisture depletion even at early stages of growth. These problems are not encountered in beushened fields.

**Disadvantages of Beushening**

**Low plant stand:** In *beushening*, insufficient rain after sowing results in poor germination and low plant stand. Rain must be adequate to

promote fast seed emergence, better plant stand, and high yield. *Beushening* also results in some damage to rice seedlings and their uneven distribution. Therefore, farmers use higher seed rates, ranging from 130 to 240 kg ha<sup>-1</sup> to compensate. Further, flash floods just after *beushening* usually increase plant mortality.

**Poor weed control:** Weeds are the second most important constraint to rice production after drought/submergence in eastern India. They depress yield considerably in direct dry-seeded lowlands. Infestation of *balunga* or *karga* (wild rice) is a serious problem in eastern Madhya Pradesh. The effectiveness of traditional cultural operations such as *beushening*, which helps to minimize weed infestation, depends on an active monsoon in the early stages of crop growth. When *beushening* is delayed because of rain, weeds grow well and use up most nutrients for the rice crop and also suppress tillering.

**Lack of high-yielding varieties:** Semi dwarf short-duration cultivars are reportedly unsuitable for *beushening* as their grain yield decreases considerably because of stem breakage during wet plowing and laddering. *Beushening* is not good for all rice varieties in the lowland ecosystem irrespective of stature, quality, and duration.

Chandra (1999) reported that, among three medium-duration rice cultivars differing in stature and quality, *beushening* was beneficial for semi tall (115 cm) variety Moti when compared to Padmini, (130 cm tall) and T-141.

**Lower crop yield:** Lower yields of rice in the *beushening* system are due to reduced plant stand, poor weed control, less spread of high-yielding varieties, lodging, low fertilizer use and lower fertilizer-use efficiency, almost negligible use of plant protection measures, and drought and flood (Singh *et al.*, 1994 and Chandra 1999).

### Conclusion

Traditional system of rice cultivation like *beushening* is more sustainable compared to transplanting system though yields are lower which needs to be improved with refinement of package and practices.

### References

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