On-Farm Adaptive Research: Approaches and Methodologies in Temperate Areas of India

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Introduction

Because of climatic constraints, agriculture in temperate areas of India is mostly limited to a single grain crop. During winters vegetable or oilseed crops may be cultivated at the lower altitudes but the higher altitudes remain barren due to snow cover. Horticulture, another important pursuit of farmers is again limited to summers. In order to supplement their income, the farmers in these areas have taken to livestock rearing for a long time now. Right from the lower hills of the Himalaya upto cool semi arid deserts of Ladakh, this is the common occupation of farmers.

Grazing in forests and pastures provide major share of herbage. During lean period of winters, crop residues and conserved tree leaves are fed to the livestock. Forage from grazing and conserved materials is too inadequate to sustain the huge livestock population of Himalayan region. This has resulted in a very low livestock biomass availability. Besides, the grazing pressure on grazing lands has increased manifold causing severe damage to these areas. In order to correct the situation various agencies like Regional Station for Forage Production and Demonstration, Indian Grassland and Fodder Research Institute and State Agricultural Universities have initiated research and development of forage resources of Himalaya. Various aspects of forage production have been investigated. In order to popularise the forage production and pasture management aspects amongst farmers and graziers their participation in various programmes is very essential. These consumers and producers have to be demonstrated various technologies for enhancing the forage production. All the agencies occupied with the research and development activities of forages have transferred the technology to farmers using various methodologies. On-farm adaptive research has been one of the most important research pursuits under which both research information has been collected and the farmers have been made aware of the methodologies for forage production. The on-farm adaptive trials have, in fact, served as a pilot demonstration for the farmers.

Approaches and Methodology

Various research organizations initially undertake experimentation on a small scale. The research results are evaluated in terms of their suitability, production levels and economics. The most suitable results are then translated into large experiments to determine the sustainability of research findings on larger areas identical to the land holdings of the farmers so that the technologies prove stable once these are transferred to the farmer. To cite an appropriate example, Misri et al. (1978) evaluated various collections of oats at their Manasbal farm and found that cv JHO-810 performed the best. A larger experiment was laid out on this cultivar and it still produced 47% higher green forage yield than cv Kent, which is a common variety of the region. During the next phase, a multilocational trial was laid out at three sites (i) research farm, (ii) orchard belonging to a farmer, and (iii) farmers rice field which remains barren during winter. This trial fairly established the adaptability of the research findings and also ensured the farmers participation. The trials laid out at the farmers fields evinced the interest of neighbouring farmers and gradually, oat became the most important and common crop of Kashmir. Similar trials have been laid out on following crops:

Winter crops

The experiments were laid out on berseem in the farmers fields in rotation with rice cultivation. A green forage yield upto 50 t/ha was achieved. Since the forage in this case is available only after March, this
crop could not attain as much of popularity as the oats. Oats on the other hand became very popular and at present more than 60% of paddy fallow is sown under oats during winter. Kale, a leafy forage which remains green even under snow was also investigated upon under on-farm adaptive trials. Exotic collections 75745, 75746 and 75747 performed very well yielding 59.6-69.7 t/ha of green forage at a time when nothing green is available for the livestock. Turnips, Triticale, barley and vetch are other crops investigated and made popular with farmers.

**Crop rotations**

Because of the land constraint it is very difficult to convince a farmer to grow fodder during summer. However, trials were conducted in the fields of some progressive farmers and following rotations were found most productive yielding upto 166.5 t/ha of green forage:

1. Maize + Cowpea - Turnip - Oat
2. Cowpea - Turnip - Oat

**Hortipasture**

An area of 80,000 ha is under orchards in Kashmir. The interspaces mostly remain barren. Trials were laid out in the orchards belonging to progressive farmers. Perennial grass and legume species were sown in lines 50 cm apart leaving sufficient space around the fruit trees for various operations. Green forage yield upto 60 t/ha was recorded in this system. This green forage is available at a time when all the cultivable land is under rice cultivation.

**Pastures**

Trials conducted in alpine pastures with the participation of Gujjar, a nomadic graziers' tribe revealed that Ryegrass + White Clover (cv Ladino) in the proportion of 75:25 is the best combination which can sustain 9 sheep/ha/year. The best forage yields were obtained with the application of 50 kg P205/ha.

**Seed crops**

Recognising the fact that there is an acute shortage of temperate fodder seeds in India, trials were laid out in the farm and farmers' fields to determine the potential for best seed production of various species. The idea behind the exercise was to make the farmers aware of the remunerative returns from seed production so that they could take up the seed production. In the case of lucerne 50-70 kg/ha seed was obtained. Berseem produced 30-40 kg/ha, white and red clover produced 40-60 and 30-40 kg/ha respectively. The yield in the case of grasses ranged from 200- 400 kg/ha.

The on-farm trials provided an opportunity for conducting research at varied habitats to come to conclusive results. This activity benefited only the farmers living around the farms or around the farmers fields where these trials were conducted. It was felt that this could involve a participation of limited number of farmers. As a result, it was thought to conduct the trials under following programmes, where the participation of farmers could be assured.

**Demonstration in Farmers' Fields**

Trials-cum-demonstrations were laid out in farmers fields. These are the actual sites where our technology could have been tested. Several such demonstrations were laid out in the farmers' fields in various regions to invite participation and eduction of farmers.
Whole Village Development Programme

Keeping in view the traditional agricultural practices of the local farmer many villages were adopted for on-farm adaptive trials. Village Kawoosa may be considered as a case study. In this village, various programmes of livestock development had been undertaken by various Government agencies without giving any thought to the forage availability - the basic requirement of any breed improvement programme. Trials laid out in this village in farmers fields caught the attention of farmers and they took to extensive forage cultivation. As a result, this village became one of the best milk producing centres.

Audio-visual aids

All the programmes described above were backed up with adequate audio visual programmes shown to farmers in and around the site of trials.

Advisory services

The Regional Station for Forage Production and Demonstration provided advisory services by discussions and visits to the farmers who would come to the station to know more about forage production.

Conclusions

The on-farm adaptive trials are basically important for the testing of a particular technology. In case the farmers' participation is involved in these, the exercise becomes pertinent since the actual consumer of forage - the farmer - is educated and enlightened. He is the only source who can create a balance between forage production and a sustained livestock product availability.

Reference