

Bio-fencing: A sustainable solution

for livestock based integrated farming system in Northeast India

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*Efforts to increase food production across India have relied on the intensification of established farms, as well as the expansion of farming activities into previously wild areas. Farms at agricultural frontiers face distinct challenges from those in historically farmed regions and require distinct support structures. Farmers near wilderness areas reported wild boar (*Sus scrofa*), as well as free-ranging domestic animals such as buffalo (*Bubalus bubalis*) and mithun (*Bos frontalis*), as major constraints to production. Farmers did not receive support or advice to mitigate crop foraging and human-wildlife conflict; instead, they relied heavily on repellence (human activated) responses, such as early warning systems and active scaring. In an effort to improve capacity building initiatives, bio-fencing could mitigate farmer-animal conflict through practical farm-level solutions and therefore, could be promoted during training programs for farmers facing challenges from free range animals in such a biologically diverse region. A bio-fence takes several years to become an established barrier. However once established it doesn't require much maintenance although gaps in the bio-fence should be filled with additional plants. As a bio-fence is not easy to be removed, it makes a sustainable solution. Therefore, it can be used as an alternative to livestock based integrated farming systems in the north eastern hill (NEH) region of India*

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LIVESTOCK tend to wander unless they are given the necessary perimeters. This makes them vulnerable to predators and theft. During the expansion of agriculture, fencing materials were costly and hard to bring. Wooden fences were few and only used by those who could afford them. Even the most expensive wooden fencing didn't last very long and hence, there was a need of an alternate fencing. The introduction of an affordable fencing option allowed crop productivity to increase further. Many villages of NEH regions already have little or no pastureland. Some live in areas where crops are grown on almost every square meter during every month of the year. A reduction in community pasturelands coupled with a loss of forest cover is pushing domestic animals (cows, goats and sheep) and semi-domesticated animal (Mithun) to forage over

farms, sometimes ruining crops overnight. Grazing is one of the most common causes of destruction of saplings in plantations. Seasonal migration of nomads from drier regions with their flock of goats and sheep results in the massive destruction of plantations and crops. In addition, given the value of land, there is a tendency of neighbouring landholders to encroach. A physical barrier to demarcate property lines and keep intruders (human and animal) becomes essential.

Types of fencing in livestock farms

Fences may be used to; protect or divide property, improve its appearance, confine animals, or exclude animals. Whatever its purpose, one should plan a fence carefully. This is especially important on farms where fences represent a large investment and their location and arrangement may

affect production efficiency.

Permanent fences are those intended to last for many years with minimal repairs, should be well constructed and made of good materials. Temporary fences are those intended to stay in place only for a short time, need not be so sturdily constructed and may be made of less expensive materials.

Wire fences

- Simple wire that is woven in different sizes is ideal for sheep, goats, pigs and chickens.
- It is cost-effective.
- Barbed wire fences are sometimes used to demarcate paddocks on a farm and may be dangerous to animals, as they can get injured when comes in contact with it and if inappropriately handled can rip of clothes and cause injuries to farm employees as well.

Wood fences

- Traditionally used type of fencing.
- Very cheap and easy to set up but not durable for a longer period of time.
- Can be used with simple wire during setup.

Hedges

- Live fence and is very cheap and appears lovely when neatly cut.
- Arduous to plant in a large area.
- Hedges encourage successive growth of weeds and may attract vermin.

Electric Fences

Electric fences can be built for temporary or permanent use. In addition, a strand of electrified wire added to other types of fence usually improves their effectiveness tremendously. The temporary or movable fence is usually made with one or two strands of smooth wire or a rope or tape with small electric wires woven into it. Tape or rope is more flexible than smooth wire and is much easier to handle and move from one location to another. It is also more visible, which is an important factor when a fence is to be moved periodically to new locations where livestock are not used to seeing it. There are a few disadvantages, however as a home-built unit can be highly dangerous. Only approved fence chargers should be used.

Bio-fencing

Bio-fencings are lines of trees or shrubs planted on farm or field boundaries that provide protection against cattle and wildlife, act as windbreaks, control soil erosion, provide bee forage and shade. They are less expensive and more useful than fences made of wood, barbed wire or stone masonry. Various species have been tested to discover their suitability for use, as bio-fencing plants thorny species have been widely used.

Bio-fencing aims to serve the dual purpose of live fence and supplementary diet for semi-domesticated animals like mithun, wild pigs, and to reduce the deforestation due to cutting of live

trees for fencing. The compact wall of planted trees will reduce the mobility of mithun in their designated areas when fully matured. Apart from this the plants can also be utilized for fruits and branches or firewood. Farmers mainly used *Docynia indica* fruits for consumption. But with bulk plantation in the area, there is a potentiality that the fruits can be marketed.

Importance of bio-fencing

- To prevent wild animals from entering residential areas, protect agricultural crops and livestock in adjoining areas and forests prevent animals wandering into agricultural land.
- In extensive livestock production system animals are kept free-range for part or all of their production cycle. They can damage the plants by feeding on plant parts or simply by running over the field and trampling over the crops.
- In an attempt to ensure maximum income, some farmers will combine a few crop with livestock. Livestock based integrated farming systems without fencing may easily cause significant crop yield losses and provoke additional financial problems.
- If local farmers agree to be part of the bio-fencing exercise, they can earn by growing lemongrass, a good source of oil. This biotic method is environment-friendly and harvesting of such plants can also be economical for farmers.

Bio-fencing and livestock management

- A very unique yet very effective method to tackle the human-animal conflict.
- It surely minimizes threat to agricultural activities.
- The fallow land on which they graze on is also well fertilized by their manures.
- Animal welfare is generally improved because animals are not kept in stifling conditions.

Bio-fencing: An approach to promote animal welfare

Mithun plays an important role in social and cultural tradition of

the tribal in the NEH region. Since mithun is reared under free grazing condition or semi-wild condition, it thrives on the jungle forages, tree fodder, shrubs, herbs and other natural vegetation in the forest area without any additional housing or feeding facilities. Therefore, mithun is very susceptible of being preyed by the wild animals since it is more exposed to wild life.

However, fencing of mithun ranges are done using wood, stone, bamboo and other locally available materials by farmers. Conflicts arise between the animals and farmers due to unreliability of the traditional fence and fodder scarcity in mithun ranges, which makes these animals to wander into agricultural lands. Thus, bio-fencing is a small step taken up to conserve this magnificent animal *in situ*, which nature has gifted, under the care of tribal northeast.

A case study of Bio-fencing

In Uttarakhand, lemongrass, agave, rambans, certain species of chilly and some other plant species have been identified to be grown for fencing. Leopards and bears, along with elephants and wild boars are a major threat to human life, livestock and crops. Traditional methods like solar-powered wire fencings, walls and pits in the woods prevent the entry of elephants, wild boars, tigers, leopards and others in residential areas.

Bio-fencing with lemongrass is done to prevent entry of elephants because elephants do not like the smell of lemongrass. Likewise, agave is also grown to deter elephant and wild boars.

Way ahead

- The solutions are often specific to the species or area concerned and are often creative and simple. Solutions should lead to mutually beneficial co-existence.
- As arable area shrinks, there is more and more pressure to secure land asset by building a physical barrier.
- Successful conversions of wastelands into productive arable land, requires physical barriers

for protection from grazing and encroachment.

- Farm diversification through integrated farming has been identified as an effective tool for achieving the multiple objectives of food and nutritional security, poverty alleviation, employment generation, environmental improvement and above all the judicious use of natural resources.

SUMMARY

The average size of agriculture landholding in India is reducing and there is no further scope for

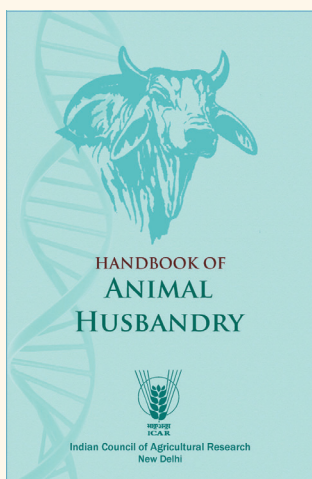
horizontal expansion of land for agriculture. So, vertical integration of various enterprises is need of the hour. The challenge is how to increase the food supply, particularly food of animal origin, in light of increasing global demand from predominantly urban populations with increased purchasing capacity. Livestock population is increasing and adequate feed would be easily available at reasonable price to rear them under intensive housing system. Improvements in farming model can meet the nutritional demand in the household and

increase their livelihood security by increasing their social standing and financial autonomy. Therefore, bio-fencing could mitigate farmer-animal conflict through practical farm-level solutions and could be promoted during training programmes for farmers facing challenges from free range animals in such a biologically diverse region.

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HANDBOOK OF ANIMAL HUSBANDRY

Livestock sector has created a significant impact on equity in terms of employment and poverty alleviation. After staple crops, livestock sector is the second most important contributor to the agricultural economy. The



producer prices of meat, eggs and milk, in India appear to be highly competitive as the domestic producer prices of these products are quite low compared to the ex-farm gate prices of major exporters in the world markets. A knowledge resource is essential to harness the potential of animal production. The Indian Council of Agricultural Research brought out first edition of *Handbook of Animal Husbandry* in 1962 for serving the end-users ranging from livestock owners to academicians. This is the Fourth revised and enlarged edition of *Handbook of Animal Husbandry* which includes 48 chapters under nine sections, such as Animal Genetics and Breeding; Animal Nutrition and Feed Technologies; Animal Management; Animal Reproduction; Animal Health Management; Animal Biotechnology; Animal Products, Technology and Machineries; Economics and Trade of Livestock and Poultry Enterprise; and Social Sciences. It has 19 new chapters like Impact of Biotechnology, Nanotechnology; Applications in Animal Sciences; Carbon Trading; Mechanisms

and Opportunities in Livestock Sector; Intellectual Property Rights Regime; Indigenous Technical Knowledge etc.; and old chapters were revised holistically. The fourth revised and enlarged edition of *Handbook of Animal Husbandry* will prove useful to the students, teachers, livestock/poultry farmers, and to especially those who visualize the economic growth of country with the support of livestock sector.

TECHNICAL SPECIFICATIONS

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