

Controlling Monkey Menace

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Jammu division of J&K UT is well known for its large diversity in terms of physiography, flora & fauna, cultural richness and agro-climatic variations. Temperate, Intermediate and Sub-Tropical Agro-climatic Zones exists within a small geographical area which again underlines the vast agricultural potential in the division. Hilly terrain, Small and fragmented land holdings (Av. Holding size: 0.60 Ha) are the characteristic features of hill Agriculture in the Division.

Overview:

Over the past few decades there has been a steady and steep increase in the population of *Rhesus macaque (Macaca mulatta)* commonly known as **monkey**. The population of monkeys has grown at an alarming rate during the last decade. According to the last count there were 50 million monkeys in India which has resulted in their migration from the forest areas towards towns and cities and also to the cultivated areas. There is no centralised data bank on monkey raids in the country. According to the official and media reports, 20 States/UTs have reported significant crop damages due to monkey attacks. In 2018, about 250 villages in Jammu reported loss of farm produce worth Rs. 33 crore because of invasion by wild monkeys. Sometimes in severe attack, they cause damage upto 90% in agriculture and horticulture. They raid crops and utilize the agro-ecosystems for food resource and shelter. Hence monkeys are considered pests in the areas of massive agriculture, horticulture and other plantations since they damage the crops and orchards.

Significance:

Crops damaged by the Monkeys are a matter of grave concern. Monkeys like a wide range of food, including roots, shoots, leaves, fruits even grasses. The large tracts/chunk of agriculture land has been left barren due to huge armies of defiant monkeys. Gross cropped area of Jammu Division is 7.48 lakh ha, out of which 0.335 lakh ha area is affected due to monkey menace, affecting 81298 farming families covering 1590 villages with economic loss ranging from 15 to 40 % thus forcing the farmers to abandon the agriculture activities and seek migration to cities and other areas to eke out their livelihood due to their adversely affected agrarian economy. Monkeys also cause substantial losses to the fruit crops like mango, guava, grapes, citrus fruits, litchi, pear, peach, plum, apricot etc. in large area of the state resulting in a great loss to the orchardists. It is observed that the incident rate is more during early morning and evening. Moreover, migration of monkeys resulted in decline of the seed dispersal of

wildplants of the forest area which can endanger some forest plant species. Due to religious sentiments monkeys can also not be killed.

Monkey species in Jammu



Rhesus macaque / Macaca malatta
(Pest)



Grey langur or Hanuman langur
Semnopithecus sp.
(Predator)

Monkey menace in Jammu Division: The effect of monkey problem in terms of area, farming families, villages and per cent losses is as under:

S. No	District	Area affected(Ha)	Families affected (No)	Villages affected (No)	% loss
1	Kathua	6524	9310	165	20-25
2	Ramban	4260	6590	125	25-30
3	Reasi	4164	8151	99	15-20
4	Kishtwar	1152	8714	337	20-25
5	Udhampur	5558	15183	194	15-40
6	Samba	1609	3500	71	15-20
7	Jammu	5263	9581	226	35-40
8	Doda	1915	9657	224	20-30
9	Rajouri	3078	10612	149	15-30
10	Poonch	NR	NR	NR	NR
		33523	81298	1590	15-40

NR=Not reported

Causes of increasing man animal conflict in Siwalik foothills:

- Absence of prey, destruction of natural habitats and change in feeding habits.
- Destruction of wild fruit tree plantations / deforestation/ Scarcity of food in forests.
- Intensive Agriculture /Increased urbanisation /Climate change.
- Feeding monkeys with gram, bread and fruit as a religious activity.
- Inefficient garbage and waste management system has provided them ample food in the form of leftovers.

Suggestive Measures: The problem of monkeys menace is of a complex nature and needs a co-ordinated effort by the Agriculture, Horticulture, Animal Husbandry, Forest Departments, wild life protection department & SKUAST-Jammu to work out urgent short term measures to provide immediate relief and also needs a framework for long term and lasting solution. To strike a balance, Ecological Solution is the only answer. Integrated Farming System (IFS) approach under which the following activities are required to be adopted.

- Cultivation of crops not damaged by monkeys root crops viz. Ginger, Turmeric, Colocasia, Alocasia, Yam (Zimikand), marigold, lime, lemon, Bael, lemon grass and Lavender etc.
- Promotion of dairy farming on large scale, which requires area expansion/diversification under fodder cultivation, creation of fodder banks (green/dry) and grass mandis at grass root level.
- Promotion of fodder cultivation along with suitable cropping systems.
- On farm evaluation of fodder technologies for combating monkey menace.
- Inclusion of Agroforestry in the IFS for fruit, fodder, fuel and Timber.
- On farm evaluation of fodder technologies is the need of the hour for combating monkey menace.
- Enriching habitats in deep forest area so that sufficient food remains available to them thereby localising monkey population within deep forest by raising natural wild fruit plant viz, Fig, Udumbar, Kainth, Jamun, Banyan, Garna, Kokua, Mulberry etc.
- Technological interventions viz. Installing of Solar fencing, Electric fencing (non-lethal), Monkey Repellents, Monkey Scare guns and Laser guided alarms around the field etc.
- Use of annoying and smelling substances like dry fish packets spread around the field.
- Maintaining a balance by releasing predators / natural enemies (Langur).
- Sterilisation of monkeys.
- The monkey figure in Schedule II Part-1 17-A of the Act should be declared **Vermin** in view of Section 2(34), 61 & 62 of the Wildlife Protection Act 1972.

Intervention -wise details:

A. Indigenous Traditional Knowledge (ITK) / methods developed OR practiced by farmers

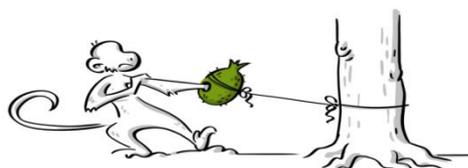
1. In most of the farmland areas, farmers guard their fields with sticks and use trained dogs to scare away the monkeys from their fields. To protect the crops, farmers deploy labours to protect the crops. Cost of labour is very high due to shortage of labour in the State and labour from Nepal, UP& Bihar are routinely hired for this purpose. Deployment of labour to guard field crops from monkey menace do not always guarantee 100% protection of crops due to human limitations of functioning in difficult terrain & adverse weather and night hours. Farmers also use crackers, gun fires for scaring away the monkeys/ wild animals.
2. Biophysical barriers: Fences made from spiny shrubs (Ber, Karonda, Kiker and other local materials) is a low-cost practice but is very effective in protecting crops.
3. A farmer in Karnataka found a unique way to protect his field by painting his dog as a tiger to scare away monkeys and claims no more monkey attack in his field since monkeys are afraid of and avoid unfamiliar species.



4. **Toy snakes:** Keep/Hang some colourful rubber snakes at vulnerable locations. Keep changing the position of toy snakes. It helps for sometime till an intelligent monkey finds out the truth.
5. **Sprinkling vegetables with pepper will deter monkeys from eating them.**The chemical Capsaicin contained in chilli is an excellent repellent against monkeys, squirrels, and some other wild animals. Farmers who grow chilli will also benefit from an extra source of income.
6. **Smoke:** Burn dung (with chilli for more effectiveness) or other materials that smoulder and create heavy smoke. Farmers burn sticks dipped in phenyl which keep the monkeys away from the field.
7. **Whip rope sound/Shrill Noise:** Monkeys hate shrill noise. Collect nearly 100 such sound clips like Lion, Tiger, Langur from internet, edit them and transfer to a pen

drive and play these predator animal sounds with an audio device that runs on a mobile battery by fixing the device on any tree / hardy plant / pole and play for 6 hours / day where monkey menace is at its peak. Keep changing the files so that monkeys should not get use of it (practiced in Punjab). Farmers in rural areas of Jammu use a three band tapering rope (*Tratta*) for creating gun fire like cracking sound for scaring wild animals and birds.

8. **Reflective ribbons:** In Varanasi fences are being made with reels of audiotape that are wrapped round the bamboo stands. Reflective ribbons are also used as repellent.
9. **Using dry fish as repellent:** Some farmers hang dry fish on the branches / keep sealed small packets with boneless dry fish pieces around the field. On opening the packets, monkeys rub the hands to get rid of smell till it bleeds. They never enter the same field with their team.
10. **Using chilli powder rice balls:** Boiled rice + crushed groundnut seeds + red chilli powder + coconut oil around the field deters the monkeys. On tasting the rice balls, they feel burning of tongue and thirstiness due to which monkeys will avoid the area. No water should be available in the vicinity.
11. **Painting a troop member:** Painting one troop member (preferably) a dominant male, with white / red and releasing him scares the troop away as he runs towards them.
12. **Creating buffer zones:** Keeping regions of partially cleared land surrounding farms as buffers of less desirable crops.
13. **Effigies:** Erecting effigies of human or predator species (python, lion, leopard, black cat etc.) in the fields for scaring monkeys.
14. **Use of fire crackers:** Use fire crackers which make huge sound.
15. **Sound device:** Innovative sound device scientifically validated by scientists-SKUAST-Jammu have been successfully used in villages Ramkot and Bhool of Kathua district costing ten rupees only.
16. **Monkey Trap:** The trap “consists of a hollowed-out coconut, chained to a stake. The coconut has some rice/banana inside which can be grabbed through a small hole”. The monkey’s hand fits through the hole, but his clenched fist can’t fit back out. The monkey is suddenly trapped. A terrified monkey along with his team avoids coming to the area again.



B. Promotion of Sustainable and long term interventions:

1. **Crop diversification:** Cultivation of crops not liked by monkeys should be promoted in the affected areas:
 - a) **Root crops** such as Ginger, Turmeric, Colocasia, Alocasia, Yam (Zimikand)
 - b) **Horticulture crops** such as marigold, lime, lemon, aonla, karonda, bael, anardana etc.
 - c) **Medicinal & Aromatic plants** such as *Sarpgandha*, *Ashwagandha*, *Brahmi*, *Kalmegh*, *Shatavari*, *Tulsi*, *Aloe vera*, *Artimisia*, lemongrass, lavender and citronella, geranium etc.
2. **Integrated Farming System (IFS):** Promotion of dairy farming on large scale should be promoted for which creation of fodder banks (green/dry) and grass mandis at local level have to be established. Bee keeping and mushroom growing may also be adopted as an alternative source of income.
3. **Agro-forestry:** Agro-forestry practices are highly specific and specialized. To adopt it on one's land, one must have a specific prescription with a complete package of operations. It involves management of crops, livestock and trees. Through agroforestry it is feasible to produce food and wood while at the same time conserving and rehabilitating ecosystems can help in containing the monkey menace without adversely affecting economy of the dependant farmers. There is a need to develop tree and crop based system which are not liked by the monkeys and are economically viable. For this purpose plantation of screened trees and crop species not liked by monkeys needs to be promoted. Spices based agro forestry system is considered as one of the best systems for ensuring livelihood security in man monkey conflict. Plants like **bamboo**, eucalyptus, popular, willow etc. can also be grown in abandoned fields.
4. **Forest plantation:** Fruit loving trees which are preferred by the monkeys needs to be planted in forest , periphery of forest and other protected areas/boundaries to augment the food availability for them so that they remain restricted in the forest areas only and do not come out in the villages to damage the agricultural crops.
5. **Area expansion under Fodder:** To minimize the losses accrued due to Monkey Menace, supplementing farm income through enhanced fodder production round the year is a promising strategy for achieving not only desired annual growth of agriculture sector @ 4% but also accomplishes steady farm income by enhancing productivity from the livestock sector. This would require a steady supply of fodder for supporting the livestock population. The need of the hour is,

therefore, to fulfil this shortfall in demand for fodder from alternate fodder crops by shifting cropping pattern and bringing more area under fodder cultivation. Fodder production should be further supported by following measures:

a. Promotion of Silage making: In view of constant increase in the cost of concentrate feed ingredients and their limited availability, green fodder is considered an economical source of nutrient for dairy animals. While increase in green fodder production per hectare of land has been emphasized, it is equally important to conserve green fodder to ensure regular supply for feeding animals, especially during the lean period. Conserving green fodder in the form of silage is one of the best options available to ensure regular supply to quality fodder through different seasons of the year. Silage is the conserved green fodder having moisture content in the range of 65 to 70 percent. Fodder crops rich in soluble carbohydrates are incubated after chaffing for 45-50 days under anaerobic conditions. Sugars present in the fodder are converted to lactic acid, which acts as a preservative and a good source of readily fermentable sugars for the rumen microbes. Keeping in view the importance of Silage, fodder crops, such as Maize, Sorghum, Oats, Pearl millet and hybrid Napier rich in soluble carbohydrates are most suitable for fodder ensiling. Quality of silage can be improved with the use of suitable additives such as molasses, urea, salt, formic acid etc.

b. Fodder enrichment: Fodder enrichment through protein addition leads to enhanced quality of dairy product production. This can be achieved through combination of leguminous fodders harvested from fields and trees, enriched with oil cakes.

c. Fodder Mandis: For better handling of enhanced fodder production, various fodder mandis needs to be established in all the districts of the province where in Farmers (both buyer & seller) can trade fodder with ease and at a premium, with a reduced distance & time in the whole fodder-chain.

6. Medicinal & Aromatic Plants Cultivation: Farmers can now check the losses caused by these primates on fields by adopting the farming of Medicinal/herbal and Aromatic plants in areas affected. Many species of medicinal plants including *Sarpagandha*, *Ashwagandha*, *Brahmi*, *Kalmegh*, *Shatavari*, *Tulsi*, *Aloe vera*, *Artimisia* etc are not liked by monkeys and major benefit of practicing farming of herbal plants is that monkeys do not eat them. Besides this, it also adds to the productivity of soil that boosts production of next crop to be produced on that

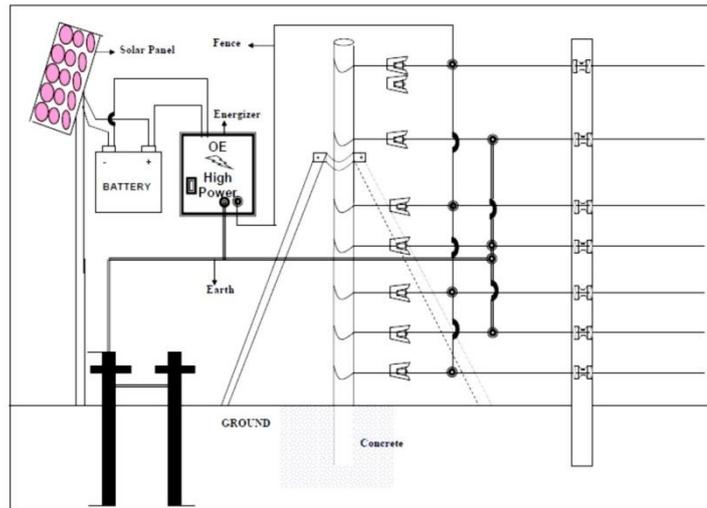
land. Since herbal plants are used for preparing medicines, there already exists an established market for their produce. Similarly, aromatic plants such as lemon grass, lavender, citronella, geranium and pamarosa etc can also be cultivated to check this menace.

7. **Natural Predators:** Use of natural enemies of monkeys needs to be promoted. Langur is a natural enemy of monkeys and even a single langur scares a large group of monkeys. Forest department in collaboration with SKUAST-Jammu should start a controlled breeding programme of Langurs so that they can be trained and used as domesticated control animals or released in nature in the problematic areas.
8. **Use of solar operated bioacoustics :** Bioacoustics uses natural sounds(70-110 decibels) of predators, distress and alarm calls of target and closely related species of target animals. Approximate cost of such devices is Rs26000/-.



9. **Solar Fencing:** While number of alternative methods is practiced by farmers and government to protect the crops from damage by monkeys and wild animals, none of these assure 100% success in crop protection. A new technique of power fencing is seen as ultimate solution. The solar powered fence electrifies the fence with pulsating current and these pulses are the “shock” felt by an animal that touches an electrified fence. Unlike a conventional fence, an electric fence is a psychological barrier such that animals learn to respect the fence. Any periphery can be solar fenced, though the cost differs with respect to the area to be fenced. The fence is like barbed wire fencing with multiple strands of plain wires and metal/cement/ wooden posts to hold the strand in position. The wires carry high voltage current. The Solar Power fence gives a sharp, short but a non-lethal shock to the intruder and creates psychological fear, against any tampering. The alarm incorporated in the system gets activated and alert the inmates of the protected area.

These are tailor made fences and can be designed according to need and site condition. The average cost per running meter of rows fence comes to Rs.396/Meter (approx).



10. **Use of Plastic fences:** Polypropylene fences/Fish nets (Nets) are **generally less expensive and easier to install and repair** than other types. Additionally, these fences are **widely acceptable** and meet various regulations.
11. **Chemical repellents:** active substances such as Anthraquinone, Butanethiol, and Methyl Anthranilate can be used to keep monkeys away from crops. Thimet granules @10gm mixed with 2 g of sand kept in punched polybags in the border area will repel away the monkeys. Chemical signals play a crucial role in animal behaviour and studies proved that predatory urine repels the monkey. Animal repellent Ricinoleci acid (trade name -Neelbo) application is effective for 20-30 days (Price 800/Lt). Mix 500ml of Neelbo with 2.5 litres of water in a bucket and soak the recommended jute/coir rope (1.5 ft X 1.0 ft) in the mixture. Tie the rope on the perimeter of the field. Repeat the above process once every 3-4 weeks. High concentration of phytoestrogens (Soya beans and cluster beans) induces infertility in monkeys.
12. **Use of concertina wire:** Mesh of metal strips with sharp edges whose purpose is to prevent passage by humans can be used. The term "razor wire", through long usage, has generally been used to describe barbed tape products. This wire can be used to protect kitchen gardens & high value Horticultural Plants in the highly affected areas.
13. **Ultra Sonic Repellent:** Number of monkey repellents is used by the farmers domestically but high-powered ultrasonic monkey repellent with special **"Multiplex Modulated Sweeping Ultrasonic Sounds"** can be more effective. These high intensity ultrasonic sound waves (10-65 KHz) are out of the range of

hearing of humans and most household pets, except pests. These waves results in the voluntary repulsion of monkeys by directly penetrating in their brain and nervous system thus making them uneasy and uncomfortable and force them to leave the area.

14. **Artificial Intelligence (AI):** A group of researchers at the Indraprastha Institute of Information Technology (IIIT) in Delhi, working with a grant from “**Microsoft AI for Earth**”, is using artificial intelligence (AI), machine learning, cloud computing to track the movements and identify monkeys in a bid to come up with a humane solution to the rampant monkey problem in the capital. The researchers are also developing a mobile application that will allow people in Delhi to capture photos of monkeys, tag their location and upload them directly to the project’s database. Once uploaded, the researchers from IIIT Delhi and the city’s animal control officers would then be able to identify and locate monkeys that require sterilisation. Furthermore, the tagging of geo location data allows the team to monitor the movement of groups of monkeys across certain locations. This can be useful in detecting population displacement and to reduce conflict between humans and monkeys.
15. **Monkey scare gun:** It is a potential device to protect agricultural crops from monkeys. The cannon fires with a loud sound due to combustion of gas. Through the sound produced by the use of calcium carbide (available in welding shops), 2-3 acres are covered. It is easy and safe to use when compared with PVC Cannon. The device is harmless for humans and Monkeys. If used properly, the device would last for 10 Years. (Product in collaboration with ICAR-Jodhpur & PJTSAU-Hyderabad, approx. cost-Rs.4040/-).
16. **Modern Monkey Traps:** Modern monkey traps are cost effective and can be used to catch the monkey and shift them to their natural habitat.



17. **Awareness among the masses:** A wider awareness of all the stakeholders is required for curbing the monkey menace. All the above mentioned control measures should reach to the masses so that they can adopt any of the given control measures according to their need and availability. The concerned departments can coordinate and organise camps and distribute literature in the affected areas. A mass campaign in this respect is required to be initiated.

C. Policy Decisions Required:

- 1. Sterilization/ Castration:** Cruel and barbaric control methods like killing are inexcusable. Sterilization can be a better option. For sterilization/castration of monkeys, creation of proper infrastructure & man-power are needed. Amazing work carried out by the wildlife wing of the “Himachal Pradesh Forest Department” had a major impact on the control of monkeys throughout India and can be adopted. A female monkey is sterilized in just one and a half minutes and that a male vasectomy takes about the same time. It is easily possible for one small team to efficiently sterilize at least 60 monkeys in a day. Himachal Pradesh has sterilised at least 1.4 million monkeys since 2006 to 2018. As a result of the constant efforts put in by the forest department of HP, now the numbers of *Rhesus macaques* have started dwindling.
- 2. Wildlife (Protection Act 1972):** Under part I schedule I of Jammu & Kashmir Wildlife Protection Act monkey (*Rhesus macaque*) is a protected wild animal and can't be killed. Further, Wild life department has issued notice viz-a-viz that any feeding, luring, baiting to monkeys is an offence under the provisions of the Wildlife Protection Act and punishable accordingly. This will lead to seizing, confiscating food articles, vehicles as well as fine and imprisonment. **The provision of this Act should be implemented in letter and spirit so that the man animal conflict can be checked.**
- 3. Amendments in the Wildlife (Protection Act 1972):** Keeping in view the above facts, significance of losses of agriculture crops and to public life in general some appropriate amendments in the Wildlife Protection Act 1972 are required for curbing the menace of monkeys. *Rhesus macaque (Macaca Mulatta)* figure in Schedule II Part-1 17-A of the Act can be declared **Vermin** in view of Section 2(34), 61 & 62 of the Act.
- 4. Inter-departmental Co-ordination:** Combinations of strategies are needed to control the monkey menace in the state. To eke out the livelihood of the farmers, the departments (i.e., Agriculture, Horticulture, Animal Husbandry, Wildlife & Forest and SKUAST-Jammu) need to work collectively for the effective and timely solution of this serious problem/critical issue. For that a team of taskforce should be formed with one officer from each department to frame the strategy and execution for better results.

Disclaimer: the contents of the paper are compiled from the available data from different sources and the information is for awareness among various stake holders.

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