



HIMALAYAN INSTITUTE OF ALTERNATIVES, LADAKH

An Alternative Institute for Mountain Development

Desert greening project



**Funded by
Make My Trip Foundation**

CONTENTS:

1. Executive summary
2. Introduction
3. Improved Miyawaki method Brief methodology
 - Land preparation/ Initial works
 - Planting material collection
 - Plantation
4. Enumeration
5. Irrigation
6. Future plans
7. Expected outcome from the project

LIST OF GRAPHS:

Fig 01: Average Max and Min temperature in Leh.

LIST OF TABLES:

Table 1: Lists of plant species planted in Spring (May-June 22), Autumn (Nov-Dec 22). to be planted (Jan to June 23) are listed below.

Table 2: Lists of plant species planted in May-June 22 are listed below.

Table 3: Lists of plant species planted in Nov-Dec 22 are listed below.

Table 4: Lists of plant species to be planted in March- April 23.

Table 5: Number of people benefitted from the project.

Table 6: Expenditure details.

LIST OF FIGURES:

Fig 1: Interaction with people having knowledge on native plants.

Fig 2: Collection of Russian olives.

Fig 3: Collection of wild rose A.

Fig 4: Collection of wild rose B.

Fig 5: Nursery raising in a greenhouse.

Fig 6: Nursery raising in trench.

Fig 7: Plantation in spring A.

Fig 8: Spring plantation B.

Fig 9: Autumn plantation A.

Fig 10: Autumn plantation B

Fig 11:Autumn plantation C

Fig 12:Autumn plantation D

Fig 13:Irrigation through drip system

Fig 14:Irrigation through pipe in winter

Executive summary

Plantation work at HIAL, funded by MMT was conducted with a focus on developing afforestation techniques with high density plantation of native plant species that can best suit for greening a barren deserts ecosystem of Ladakh. Since the Miyawaki method has been unsuccessful in a region like Ladakh where the climate is very harsh with very low humidity, we have installed a drip irrigation system, this drip irrigation system ensures the water requirements for the plants are met without any major wastage. Adopting irrigation techniques most appropriate for the region is one of the many ways the Plantation team at HIAL works on desert greening. Plantation was performed in two plantation seasons i.e. spring and autumn planting using tree/ shrub species that were either native to the region or having drought tolerant qualities. In the next half of the project we will also plant perennial medicinal herbs that will work as live mulch in addition to being used for its medicinal properties. During six months of the project we planted a total of 10,000 plants; the remaining 2500 will be planted in the next half of the project. Survival and plantation status of the project is given below:

Table 1: Lists of plant species planted in Spring (May-June 22), Autumn (Nov-Dec 22), to be planted till April 23) are listed below:

S.no	Name of plant species	Plantation nature	Total planted	Total survived	Survival %
1)	Russian Olive (<i>Elaeagnus angustifolia</i>)	Spring plantation	2760	2131	77.2
		Autumn plantation	1515	*	-
2)	Kikar (<i>Robinia pseudoacacia</i>)	Spring plantation	2900	1795	61.9
		Autumn plantation	715	*	-
3)	Wild rose (<i>Rosa webbiana</i>)	Spring plantation	2320	1029	44.4
		Autumn plantation	2000	*	-
4)	<i>Ephedra gerardiana</i>	Spring plantation	20	17	85
	Mulberry	Autumn plantation	30	*	-
5)	<i>Juniper polycarpus</i>	Autumn plantation	5	*	-
	Total planted	Spring plantation	8000	4972	62
	Total planted	Autumn plantation	2000	*	-
Remaining plantation to be done till April 2023					
S.no	Habit	Name	No.s	Total	
1)	Tree/ Shrub species	Caragana, Seth, Lonicera, etc	1000	2500	
2)	Medicinal plants	Oregano, Mint, Ephedra, Mavla, etc	1500		

INTRODUCTION

Himalayan Institute of Alternatives, Ladakh (HIAL) was granted around 125 acres of land by the Ladakh Hill Development Council, Leh (LAHDC, Leh) in the Phyang desert for the construction of its university campus. HIAL envisages to have 70% of its total land (around 100 acres) to be green. Local, drought resistant species are to account for the majority of the greenery in this barren and unfertile desert land. The MMT Foundation supported this desert greening initiative in 2022 by allocating a fund of Rs 43,50,000 for plantation of 12,500 plants that are either native to the region or plants having drought tolerant properties.

Ladakh is a high plateau extending from the Himalayas to the Kunlun mountains. The region is cold and some regions experience heavy snowfall, while others are dry. The summers are dry and pleasant, long enough to grow crops. The average temperature ranges from 20 to -15 degree celsius (Fig:1).

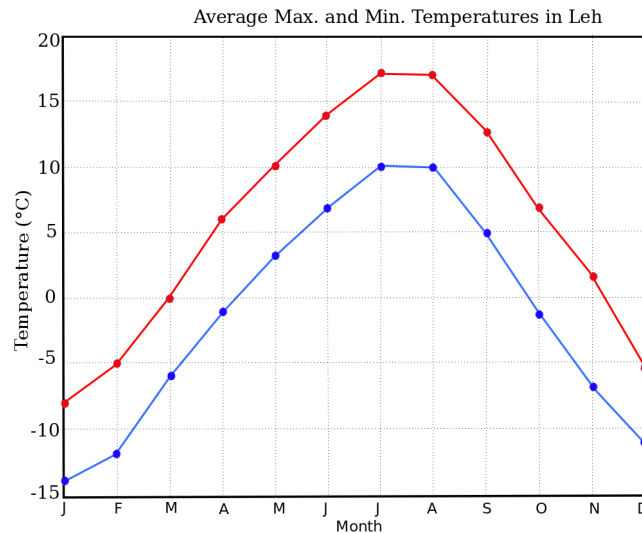


Fig 01: Average Max. and Min Temperature in Leh

Vegetation is extremely sparse in Ladakh except along streambeds and wetlands, on high slopes, and irrigated places. About 1250 plant species, including crops, were reported from Ladakh. Due to erratic and extreme climatic conditions, it is a cold desert and hence growing crops or trees becomes very difficult.

High density tree plantation for desert greening initiatives:

Owing to the region's harsh climatic conditions (as discussed above), the distribution of vegetation is sparse and takes a long time to grow and mature. In the HIAL Campus where surface water sources are currently absent, there are an additional set of challenges posed to plantation operations. Hence, in this plantation programme a high density tree plantation for desert greening initiative method has been adopted for the plantation of 12,500 plants here 1-2 liters (or more) of water is allocated per plant each day especially during summer season, an appropriate irrigation system ensures required soil moisture is maintained. The careful selection of plants and the efforts to improve the quality of the soil undertaken by the plantation team will play a key role in ensuring the regreening efforts will be completed successfully and sustainably. The plants selected by the team are native or are species with water requirements that do not exceed the quantity of water currently available. Certain trees usually used for plantation operations in the state have been deliberately excluded to ensure hydro-ecological stress to the environment is minimized. Efforts to build soil will enhance the water holding capacity of otherwise loose soil and trigger more effective growth of soil biodiversity (specifically beneficial local biota). The forests generated will also serve multiple purposes such as acting as physical barriers from gazing wind of spring season. Species chosen for this plantation were - the native seabuckthorn (*Hippophae rhamnoides*), which provides medicinal berries and excellent habitat for wildlife, and the native wild rose (*Rosa webbiana*), which is tolerant to Ladakh's dry conditions, Kikar(*Robinia pseudoacacia*)- which is fast growing, a valuable and resistant wood, suitable for ecosystem amelioration, reclamation of disturbed sites and erosion control, drought tolerant and is a honey-making plant, *Russian olive Elaeagnus angustifolia*) - used with syrup as an electuary in the treatment of catarrh and bronchial affections. The addition of medicinal plants this upcoming spring i.e. till April 2023 will not only provide opportunities to create therapeutic and medicinal products, it will also serve as live mulch for the trees.

BRIEF METHODOLOGY:

➤ Land preparation/ Initial works

In order to carry out the plantation work, initial land preparation was undertaken, which included digging the soil with JCB, manually eliminating big stones and finally making appropriate soil by mixing clay, sand and manure. The purpose of land preparation is to provide the necessary soil conditions which will enhance the successful establishment of the young offshoots or seed sown plants. Similarly procurement of consumables and non-consumables like agricultural tools and equipment, different materials (dry leaves, clay & farmyard manure) has been done.

➤ **Planting material collection**

In order to complete the target of planting 12,500 saplings, various excursions were done by the team and interns. Saplings of the native species were collected from the nearby villages and places in order to use them for plantations. Similarly, a small number of uprooted saplings were also collected from Phyang and Tia village. Since the native plant species are very few in nature cuttings were preferred as compared to uprooting. Lists of figures of time of collection are given in Table:



Fig 1: Interaction with people having knowledge on native plants



Fig 2: Collection of Russian Olive



Fig 3: Collection of wild rose A



Fig 4: Collection of wild rose B

➤ **Plantation :**

The plantation were done in two season i.e. Spring and Autumn plantation. 8000 saplings were planted in spring and 2000 were planted in Autumn. The nursery of the native plant species were raised in a greenhouse and transplanted in an open field for spring plantation and for autumn plantation cutting were directly planted in the field. All the different species were planted in a mixed pattern following the permaculture practice in order to mimic the plants that are growing in their natural habitat. Plantation operations were carried out with the help of different

consultants, staff, interns, *malis*, laborers and volunteers. The resulting patch of vegetation will grow thick and dense, functioning as an effective barrier once the plants establish themselves and the growth forms mature.



Fig 5: Nursery raising in greenhouse



Fig 6: Nursery raising in trench



Fig 7: Plantation in spring A



Fig 8: Spring plantation B



Fig 9: Autumn plantation A



Fig 10: Autumn plantation B



Fig 11: Autumn plantation C



Fig 12: Autumn plantation D

➤ Irrigation:

Following the daily targets of planting saplings, they were irrigated based on need which is generally thrice a week during summers and less in winters. The saplings were covered by stones in order to minimize evaporation losses. Further, the research focus is to monitor the optimal amount of water needed for the saplings and thus manage the water sustainably. It is interesting to note that plantations need less watering in autumn as compared to spring. Summer irrigation was done using drip irrigation and autumn irrigation was done using pipe watering. Pipe watering was also followed when drip irrigation was not working during summer times. Watering of these plant species will always be done according to the needs of these plant species unlike that of the Miyawaki method that is why we are naming this type of plantation as Improved Miyawaki Method.



Fig 13: Irrigation through drip system



Fig 14: Irrigation through pipe in winter

➤ **Enumeration:**

Table 2: Lists of plant species planted in May-June 22 are listed below.

S.no	Name of plant species	Plantation nature	Total planted	Total survived	Survival %
1)	Russian Olive (<i>Elaeagnus angustifolia</i>)	Spring plantation	2760	2131	77.2
2)	Kikar (<i>Robinia pseudoacacia</i>)	Spring plantation	2900	1795	61.9
3)	Wild rose (<i>Rosa webbiana</i>)	Spring plantation	2320	1029	44.4
4)	<i>Ephedra gerardiana</i>	Spring plantation	20	17	85
	Total planted	Spring plantation	8000	4972	62

Table 3: Lists of plant species planted in Nov-Dec 22 are listed below.

S.no	Name of plant species	Plantation nature	Total planted	Total survived	Survival %
1)	Russian Olive (<i>Elaeagnus angustifolia</i>)	Autumn plantation	1515	*	-
2)	Kikar (<i>Robinia pseudoacacia</i>)	Autumn plantation	715	*	-
3)	Wild rose (<i>Rosa webbiana</i>)	Autumn plantation	2000	*	-
4)	Mulberry	Autumn plantation	30	*	-

5)	<i>Juniper polycarpus</i>	Autumn plantation	5	*	-
	Total planted	Autumn plantation	2000	*	-

*To be checked in till April 23

Table 4: Lists of plant species to be planted till April 23:

Remaining plantation to be done till April 23				
S.no	Habit	Name	No.s	Total
1)	Tree / Shrub species	Caragana, Seth, Lonicera, etc	1000	2500
2)	Medicinal plants	Oregano, Mint, Ephedra, Mavla, etc	1500	

Table 5: Number of people benefitted from the project:

S.no	Designation	Number of employes benefitted	Male	Female
1)	HIAL Staff	13	5	8
2)	Mali on seasonal basis	6	1	5
3)	Villagers of Phyang	10	-	10
4)	Consultancies	4	3	1
	Total	33	9	24

Table 6: Expenditure details

S.no	Total planted	Per plant cost	Total amount	Remaining plantation	Remaining amount
1	10000	350	35,00,000	2000	8,50,000

FUTURE PLANS:

- 1) Maintenance : Stone mulching and watering
- 2) Sapling raising to spring plantation: Feb end
- 3) Medicinal plants planting material collection: Febend
- 4) Documentation of final result : April end
- 5) Capturing of pics during greenery (May end)

EXPECTED OUTCOME FROM THE PROJECT:

A hub of high density plantation patches and a botanical garden in the next five years that help in improving the biodiversity of the region, benefit the local students, scholars, researchers, generate ecotourism and further aid in the desert greening project of HIAL.