HIMALAYAN INSTITUTE OF ALTERNATIVES, LADAKH

An Alternative Institute for Mountain Development

HIAL Desert Greening Initiative

QUARTERLY (1OTH) PROGRESS REPORT APRIL TO JUNE 2021

FUNDED BY

MakeMyTrip Foundation

Executive Summary

In this quarter, the plantation team of Himalayan Institute of Alternatives, Ladakh (HIAL) planted various species by different techniques like seed germination, cutting propagation and sapling transplantation. This included 30,000 seabuckthorn, 10,000 robinia and around 810 other drought tolerant plant species. The total plantation in the 10th quarter was 40,810 plants. The plantation of these new plants along with operation and maintenance of the existing ones cost around Rs 9 lakhs. This quarter brought two fold challenges in the form of lockdowns due to Covid and water shortage due to sudden disruption of the existing borewell, when it was the peak growing season for plants. To combat the problem, while on one hand we laid a pipeline of almost 1.6 km to pump water to the campus from a well-wisher's land, we also invented a new method of capillary action for watering drought tolerant plants . Because of these issues, plantation couldn't be done on a scale that was planned this season, and will be achieved in the coming seasons of Autumn this year and Spring next year. Additionally, research trials on drip irrigation for watering plants at biofence will also be conducted in the upcoming quarter. With these developments, we are sure to plant at least 50,000 saplings and are hopeful to extend it up to 1,00,000 plants of different trees and shrubs in open field condition.

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Introduction

The trans-Himalayan region of Ladakh is sandwiched between the borders of Pakistan and China. Ladakh remains difficult to access, both on account of its physical geography and on strategic and political grounds. The region comes under alpine and high alpine zones and it exhibits a great diversity in soil vegetation, and topography, rugged terrain, low annual precipitation and humidity, fluctuating temperatures and high desiccating winds. The vegetation is mostly dominated by annual and perennial herbs, a few shrubs and trees which either grow near water available areas like indus water, different streams, mountains or are irrigated manually. The vegetation starts at the beginning of summer when the melting of snow provides abundant moisture. Adaptation to the environment by the potential flora of a region leads to certain changes in underground and aerial parts of plants for their survival. The vegetation of the cold desert Trans-Himalayas consists of a highly specialized group of plants with metabolic and reproductive strategies suited for maximizing their activity in harsh climatic conditions. The plant of high altitude cold deserts exhibit a number of ecological, morphological and physiological adaptations which help them to counteract the impact of harsh climate prevailing in Ladakh.

Himalayan Institute of Alternatives, Ladakh (HIAL) is an alternative institute of higher learning. The main pedagogy of the institute is experiential learning where the students learn while doing things. This institute gained great success be it in making of ice stupa and construction of passive solar greenhouse or in running of plantation drive for carbon neutral ladakh through various social media platforms. Himalayan Institute of Alternatives, Ladakh not only aims to make its 150 acre of land green but also help other villages of ladakh in their plantation and in agriculture. Currently HIAL is working towards greening a 150 acre campus with 1,30,000 plants which will be mostly native along with some exotic tree species. The whole project is divided into different objectives which will be accomplished in 3-5 years.

List of work done in April-June 2021

1) *Robinia pseudoacacia* (Kikar) plantation
2) *Rosa webbiana* (Wid rose) plantation
3) *Elaeagnus angustifolia* (Russian olive) plantation
4) *Hippophae rhamnoides* (Seabuckthorn) plantation
5) Uplifting of water from near to HIAL borewell for time being
6) Assess the survivability of last year plantation and lists of plants planted this year
7) Plan and budget for the next quarter

Detail of plantation of different plants species from April to June 2021

Robinia (*Robinia pseudoacacia*) plantation

Robinia is one of the most widely planted woody species in the world: a fast growth, valuable and resistant wood, suitability for amelioration, reclamation of disturbed sites and erosion control, drought tolerant and honey-making plant. This year we placed an order for 25,000 Robinia plants from Srinagar for which an advance of Rs 1,47,000 was paid. Unfortunately, due to unpredictable snowing both on Srinagar and Manali routes, roads did not open for over a month and the plants died on the way in transition (Fig: 4). However, to salvage the situation, we did trials on seed germination and pencil size cutting propagation from these dead saplings (Fig: 2) in the greenhouse in early spring and got good results. In the month of May we did the germination trial on a large scale (Fig: 2) and the saplings will be ready for transplanting in Spring 2022. Additionally around 100 plants that were already grown in the greenhouse were transplanted to an open field (around biofence) in this quarter (Fig:3).

Fig 1: Cutting propagated robinia

Fig 2: Seedlings of Robinia getting ready

Fig. 3: Robinia with rock mulching

Fig 4: Plants that died on the way from Srinagar due to lockdown

Wild rose (*Rosa webbiana*) plantation

Wild rose is a common shrub, widely distributed, and growing from an altitude of 1500 m all the way to 4000 m. Flowers are borne singly, usually pink, with a white centre. Fruit is bottle-shaped to globular, red. The plant is native to the western Himalayas from the Pamir in central Asia to Kashmir, Tibet and Afghanistan. Rose hips have long been used to treat kidney stones, gastroenteric ailments, hypertension and respiratory problems such as bronchitis, cough and cold. In this quarter, we planted 58 wild roses in our institute around biofence and in the greenhouse. A new technique was researched for the plantation of wild roses also. The method is as follows: a tyre tube was filled with water and water was allowed to come out of the tube through capillary action via cotton/jute thread, the thread was entangled around the roots of the plant and the plant was planted in an improved soil media. The intervention showed good results (Fig 5, 6, 7). We plan to upscale the pilot into a large scale plantation next year.

Fig 5: Tyre-tube irrigation method for plantation of Wild rose, Robinia and Russian olive

Fig 6: Result of tyre transplanted rooted cuttings

Fig 7: Students planting wild rose on world environmental day

Fig 8: Cutting propagated rose in greenhouse

Russian olive (*Elaeagnus angustifolia*) plantation

It is a deciduous shrub growing to 7 m (23ft) by 7 m (23ft) at a medium rate. It flowers in June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs). It can fix Nitrogen thus helps in making the soil fertile. It prefers dry or moist soil and is drought tolerant. The oil from the seeds is used with syrup as an electuary in the treatment of catarrh and bronchial affections. The juice of the flowers has been used in the treatment of malignant fevers. In this quarter we transplanted around 500 rooted cuttings of Russian Olive around the biofence area (Fig:9).

Fig 9: *Elaeagnus angustifolia* (Russian Olive) in open field

Seabuckthorn (*Hippophae rhamnoides*) plantation

Seabuckthorn (Hippophae rhamnoides L.) is an ecologically and economically important plant. The species is dioecious and wind pollinated. The female plant bears red, orange or yellow berries on 2-year-old thorny twigs. Seabuckthorn (SBT) berry is one of the most nutritious fruits and have immense medicinal properties. Concentrations of vitamins B2, B3, B5, B6, B12, C and E are much higher than other fruits such as apricot, banana, mango, orange and peach. Traditionally, every part of the plant is being used in trans-Himalayan Ladakh region for a variety of purposes such as medicine, nutritional supplement, firewood, fencing, tree guard, wind break, building construction, religious rites, agricultural implements and soil fertility enhancement. Method for plantation of the plant has been standardised in greenhouse and open condition. In the month of April we planted 30,000 cuttings of seabuckthorn (Fig 10, 11) in trenches which will be transplanted in open field condition in the autumn 2021 or spring 2022. We celebrated Earth Day by planting 15,000 Sea Buckthorn cuttings (part of the total of 30,000).

Fig 10: Seabuckthorn cutting plantation in trench

Fig 11: Seabuckthorn cutting plantation in trench

Uplifting of water from near to HIAL borewell

We explored several water solution options including repairing the bore-well that broke down, salvaging the 2nd borewell, and identifying a place for the third borewell where water is expected to be found at 300 ft compared to the existing ones where the water table was found at 500 ft. Simultaneously, we are planning for three 40,000 litres reservoirs - 2 of them made from recycled containers that can be lifted and moved as per requirement and one on the ground. This time due to the outbreak of Covid-19 second wave and closure of Leh-Srinagar highway for a longer period as compared to earlier season during the peak growing season things could come on time and fixing of borewell was not able to be performed. However, we managed to uplift water from a borewell around 1.6 km away from HIAL Rajat flour mill for the time being until the digging of a new borewell is done for watering the plants that were planted in this quarter (Fig 12).

Fig 12: GRUNDFOS CRI surface pump

Survival of plants planted till date and lists of plants planted in this season

Heads	Total Planted till Date	Survival count	Apr- Jun 2021 plantation	July to September plan
Apple Orchard	264	174	-	-
Miyawaki Plantation	2,400	506*	-	-
Apple-Apricot Orchard	44	29	-	
Bio-Fence Plantation	4,700	-	810	At Least 50,000; will aim for 100,000
Bio-Fence Extension	500	-		
Kargil Plantation	10,000	10,000**	-	
Nubra	1,500	1,500**	-	
Saplings from Nursery Scheme	19,408	19,408**	40,000	
Total	**38,816**	**31,617****	**40,810**	
***Maximum species has low survivability, count is mostly of single specie **Survival study is planned in Jul-Sep '21 Quarter**				

Survival of Miyawaki Pilot Plantation

Below are the list of the 10 species which were planted in the Miyawaki Pilot Plantation Forest in March 2021. Five out of ten species have suffered moderate to severe losses and range between 0%- 13% survival . Four species have shown no survival whilst one species, *Lepidium latifolium*, has proliferated, nearly doubling itself from the original number planted. This suggests that the standardised method of Miyawaki technique is not applicable in context to Ladakh's topography and climate. However, the method can be applied in the future with modifications developed after due research.

S. No.	Botanical name	Common name	Planted	Survival Jun 2021	Percentage
			No.	No.	
1	*Juniperus excelsa polycarpos*	Juniper, 'Shukpa'	336	46	13%
2	*Rosa webbiana*	Wild Rose, 'Siah'	336	8	2%
3	*Hippophae rhamnoides*	Seabuckthorn, 'Tsermang'	336	21	6%
4	*Lepidium latifolium*	'Shangsho'	288	414	69%
5	*Tanacetum gracile*	'Burtsay'	120	0	0%
6	*Ephedra intermedia*	'Chapat'	144	0	0%
7	*Peganum harmala*	Wild Rue	144	14	9%
8	*Krascheninnikovia sp.*	---	192	0	0%
9	*Artemisia brevifolia*	'Khamchu'	72	3	4%
10	*Carex sp.* - Unidentified grass		432	0	0%
		Total	**2,400**	**506**	**21%**

Expense details of April-June 2021

Total amount balance as on 1st April 2021: Rs 10,74,911

Next Quarter Planned Activities	Budgeted Cost (in Rs)	Actual Expenses (in Rs)	Remarks
Material			
Saplings Transportation and plantation from Srinagar	25,00,000	1,47,000	As against a total of Rs 25 Lakhs, Rs 1.47 was paid as advance. The rest was not paid as the saplings died due to protracted road closure from both Srinagar side as well as Manali side. The plants will be supplied again to us in Autumn.
Saplings from Nurseries in Ladakh	302,500	165,460-	Due to the lockdown in the months of April and May, the planting season, half of the saplings could not be sources as movement was restricted.
Apple Orchard	575,000	-	Supposed to buy from Srinagar but due to lockdown could not purchase. Postponed to Autumn.
Biodegradable bags	75,000	8,970	As Biodegradable bags available were of low quality in the first purchase lot, we postponed the decision to buy them from Delhi in the next quarter.
Sub Total	*34,52,500*	*321,430*	
Equipment			
Secateurs	4,490	4,490	
Sintex		31,294	For water storage.
Admin Cost			
Direct Salaries	375,000	2,81,640	We were under the process of hiring employees however, due to the lockdown, we postponed it to next quarter.
Repairs and Maintenance	100,000	1,15,874	Due to sudden disruption of the existing borewell
Admin (Fuel, Internet, Transportation)	80,000	45,000	In this quarter 2 months were lost due to the lock down.
Indirect Salaries (Finance, HR, Driver)	75,000	42,248	
Misc (Nut bolts,HDPE pipe connectors)	10,000	15,000	For tools and other parts to connect the pipe line of approx 1.6 km from Water pump to HIAL.
Sub Total	*640,000*	*504,252*	
Grand Total	**40,92,500**	**825,682**	
Unspent balance as on 31.06.21		249,229	
Fund Received on 16th July 2021		32,00,000	
Balance as on 17th July 2021		**34,49,229**	

Beneficiaries from MMT project to locals

- **Reducing Carbon Footprint**
    - Number of saplings planted (quarterly):
      This quarter 40,810 plants were planted; we have already submitted data of previous years.
    - Survival rate (end of the year):
      Survival of plants plated this quarter will be submitted at the end of this year; Survival of plants done previously has already been submitted.

- **Supporting Local Economies (can look at from the lens of labour involved in plantation/ project related activities)**
    - Number of local job opportunities/livelihoods generated (beginning of year as per projected plan, and end of year as per actuals):
      This quarter: 6
    - Monthly income generated from activities supported by the project (quarterly):
      This quarter generated Rs 2,81,640 from local human resources employed under the project

- **Gender Inclusion & Empowerment (subset of the above mentioned - can look at from the lens of labour involved in plantation/ project related activities)**
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    - Number of women beneficiaries (beginning of year as per projected plan, and end of year as per actuals): Women 3
    - Monthly income generated for women beneficiaries from activities supported by the project (quarterly): Rs 81,000 per month for the quarter

Work plan for next quarter (Jul - Sep 2021)

- Construction of one passive solar greenhouse, 5 trenches and upgradation of 3 existing trenches with polycarbonate sheet:
  We found that cuttings directly planted on the ground in spring or autumn plantation seasons have a very low survival rate. But those first planted in a greenhouse to grow roots and then transplanted outside have a much higher survival rate. Hence, we need to construct another passive solar greenhouse, 5 more trenches and upgrade three existing trenches with polycarbonate sheets.
- Procurement/ purchase of cuttings from local people because in this way we can help them to generate income.
- Propagation from cuttings: At least 50,000 pencil size thickness cutting propagation of native and stress tolerant plants in greenhouse, trenches and in open field.

Budgetary breakdown for next quarter (Jul - Sep 2021)

Budget head	Quantity required	Rate (in Rs)	Total Amount (in Rs)
Sapling Raising/ Storage Facility			
Greenhouse	1	-	13,00,000
	Sub-Total 1		*13,00,000*
Material			
Drip irrigation set and installation charges	7,500m	30/m (approx)	2,25,000
Waterproof shoes	10 pairs	1,200 per pair	12,000
Nursery Raising Pots	200	300 per piece	60,000
Gloves	20 pairs	300 per pair	6,000
Black mulching plastic	10 rolls	5,000 per roll	50,000
Sintex (1,000 L)	2	10,000	20,000
Pipes	2	9,500	19,000
	Sub-Total 2		*3,92,000*
Equipment			
Vernier Caliper	2	2,500	5,000
	Sub-Total 3		*5,000*
Admin			
Direct Salaries (5 person)	3 months	117,000	3,51,000
Fuel		approx	50,000
Repair and Maintenance (including 3 Trenches))	3	50,000	2,00,000
Transportation		approx	50,000
Admin expenses	3 months	23,125	69,375
Recurring (misc.exp)	-	-	10,000
	Sub-Total 4		*7,30,375*
Saplings+Plantation			
Sapling+Cutting	50,000	40	20,00,000
Labor	50,000	15	7,50,000
JCB (approx 800 hours)	800	1000	8,00,000
Trench with polycarbonate	5	1,00,000	5,00,000
	Sub-Total 5		*40,50,000*
	Total		**₹64,77,375**

Balance as on 17th July 2021: **₹3,381,689**

Expenses planned for the next quarter**: ₹64,77,375**

Sum required from MMT for the next quarter: ₹30,95,686.

Figures & status of different plants

Fig 12: Biofence plantation

Fig 13: Apple orchard

Fig 14: Apple-Apple apricot orchard

Fig 15: Miyawaki plantation

Fig 16: Juniper at Miyawaki

Fig 17: Greenhouse plantation