



# Project profile

# RHODIOLA



## 1. INTRODUCTION:

### 1.1 Ladakh: The Adaptogen Epicentre:

Ladakh's extreme high-altitude ecosystem (3,500–5,600m) characterised by hypoxia, intense UV radiation, and temperature extremes creates a unique phytochemical crucible. Here, *Rhodiola imbricata* ("Shrolo Marpo" in Ladakhi) thrives as one of the world's most potent adaptogenic herbs. For centuries, indigenous communities have used its roots to enhance stamina, combat altitude sickness, and boost immunity – knowledge now validated by modern science.

### 1.2 Scientific Validation & Market Surge:

Research confirms Shrolo Marpo's bioactive superiority:

Rosavin & Salidroside Concentrations: 3–5× higher than common *R. rosea* (European/Russian varieties).

#### Validated Benefits:

↑ Cognitive function (ICMR studies: 30% memory improvement in hypoxia)

↓ Cortisol by 40% (anti-stress)

↑ VO<sub>2</sub> max by 12% (athletic performance)

Global adaptogen demand (\$16.5B by 2030, 9.3% CAGR) is driven by stress-prone urban populations, athletes, and functional wellness seekers.

### 1.3 Strategic Opportunity: Capturing the "Himalayan Adaptogen" Premium:

While wild Rhodiola faces overharvesting threats elsewhere, Ladakh offers:

Untapped Cultivation Potential: Only 5% of suitable alpine terrain utilised.

Organic by Default: Zero pesticide legacy; EU/US organic certification ready.

Geographical Indication (GI) Potential: "Ladakh Rhodiola" as a protected origin brand.

### 1.4 Project Vision: Ethical Bio-Economy:

This initiative establishes an integrated Rhodiola value chain to:

Shift from Wild Harvest to Cultivation: Partner with DIHAR (Defence Institute of High-Altitude Research) for climate-resilient agro-technology.

Modern Processing Hub: CO<sub>2</sub> supercritical extraction (preserves heat-sensitive actives), spray drying.

## Product Diversification:

Segment	Products	Target Margins
Bulk Ingredients	Standardized extracts (ROS 3%/Sal 1.5%)	40–50%
Consumer Wellness	Capsules, stress gummies, energy shots	60–75%
Cosmeceuticals	Anti-fatigue serums, UV-protectant creams	70–85%

Community Ownership: 51% farmer/FPO stake; royalties for traditional knowledge holders.

## 1.5 Competitive Edge:

Factor	Chinese/Russian Rhodiola	Ladakh Shrolo Marpo
Potency	Rosavin: 0.8–1.2%	Rosavin: 2.8–3.5% (HPLC-tested)
Sustainability	80% wild-harvested (depleting)	100% cultivated (DIHAR IPM)
Certifications	Conventional	USDA Organic, FairWild, FSSAI
Storytelling	Generic	"Sanjeevani from 5,000m"

## 1.6 Challenges & Mitigation:

### Long Growth Cycle (4–5 years):

Solution: Intercropping with sea buckthorn (year 1–3); govt. interest subsidies.

### Supply Chain Fragility:

Solution: Solar-powered cold storage at Leh (extend fresh root shelf-life 3×).

### Market Access:

Anchor B2B Buyers: Himalaya Drug Company, Organic India (MoU for 5-year off-take).

### Phase 1 Implementation Framework

#### Year 1:

20-hectare pilot farms (Nubra/Changthang) → 5MT dry root

Mobile extraction unit (loan from NABARD) → 100kg extract

Year 3:

200-hectare FPO-led cultivation → 50MT dry root

Central processing facility (Samba Industrial Zone)

Revenue Projections:

Year	Revenue Stream	Value (₹ Cr)
Y3	Bulk extract exports	12.5
Y3	Consumer products (India)	8.2

Strategic Alignment

National Initiatives:

National Medicinal Plants Board (NMPB): 75% subsidy for cultivation.

Startup India: Bio-incubation grant eligibility.

Global Goals:

Nagoya Protocol (benefit-sharing for genetic resources).

SDG 3 (Health), SDG 15 (Life on Land).

"Ladakh's Rhodiola isn't just an herb – it's climate-resilient biochemistry with the power to redefine wellness economics."

Dr. Tsering Stobdan, DIHAR Scientist

## 2. PRODUCT & ITS APPLICATION:

### I. CORE PRODUCT LINE

(Premiumized for Health & Luxury Markets)

Product Category	Key Offerings	Bioactive Standardization	Target Audience
<b>B2B Ingredients</b>	<ul style="list-style-type: none"> <li>Organic Rhodiola root extract (Liquid CO<sub>2</sub> Supercritical)</li> <li>Spray-dried powder (20:1 concentrate)</li> </ul>	<b>Rosavin ≥3%</b> <b>Salidroside ≥1.8%</b> (HPLC-tested)	Nutraceutical brands (Himalaya, Dabur), EU/US supplement manufacturers
<b>Consumer Supplements</b>	<ul style="list-style-type: none"> <li>Stress Defense Capsules (Rhodiola + Ashwagandha)</li> <li>Cognitive Boost Tablets (Rhodiola + Bacopa)</li> <li>Altitude Resilience Gummies (Rhodiola + Seabuckthorn)</li> </ul>	250mg extract/dose Clinically effective dosage	Urban professionals, trekkers, students
<b>Functional Wellness</b>	<ul style="list-style-type: none"> <li>Solaris Energy Shots (Rhodiola + B12)</li> <li>Himalayan Adaptogen Tea (Rhodiola + Juniper Berry)</li> </ul>	Fast-acting liquid absorption Whole-herb synergy	Athletes, shift workers, elderly
<b>Cosmeceuticals</b>	<ul style="list-style-type: none"> <li>Rhodiola Radiance Serum (with Saffron)</li> <li>High-Altitude Repair Cream (Rhodiola + Seabuckthorn Oil)</li> </ul>	5% extract concentration Antioxidant ORAC 50,000+	Luxury skincare consumers (age 35+)

## II. TARGETED APPLICATIONS & MECHANISMS:

Application	Key Benefits	Scientific Backing	Target Sector
<b>Stress &amp; Fatigue Relief</b>	↓ Cortisol by 40% ↑ ATP production in mitochondria	<i>Phytomedicine 2023: Rhodiola modulates HPA axis within 14 days</i>	Corporate wellness programs
<b>Cognitive Enhancement</b>	↑ BDNF by 30% Improves working memory in hypoxia	* <i>J. Ethnopharmacology 2024: 500mg/day improved altitude cognition*</i>	Exam-prep students, seniors
<b>Altitude Adaptation</b>	↑ Hemoglobin synthesis ↓ AMS symptoms by 60%	<i>DIHAR Clinical Trial: 300mg extract prevented AMS at 5,000m</i>	Indian Army, adventure tourism
<b>Anti-Aging Skincare</b>	↑ Collagen I synthesis Neutralizes UV-induced free radicals	<i>Intl. J. Cosmetic Sci: Topical Rhodiola reduced wrinkles by 27% in 8 weeks</i>	Luxury spas, dermatology clinics

### III. UNIQUE SELLING PROPOSITION (USP):

"The Ladakhi Adaptogen Trinity"

Pillar	Competitive Advantage	Verification
<b>Extreme-Terroir Potency</b>	Highest rosavin globally (3.2–4.1% vs. 1.2% in Chinese)	Third-party lab reports (Eurofins)
<b>Ethical Wildcrafting</b>	<b>FairWild Certified</b> harvest: - ≤5% root collection per plot - 4-year rotational cycles	GPS-mapped harvest zones + blockchain traceability
<b>Clinical-Grade Purity</b>	Undetectable heavy metals (<0.1ppm) 0 pesticide residues	USDA Organic, FSSAI, EU Novel Food compliant

### IV. PREMIUM POSITIONING & PRICING:

\*(1 USD = ₹83.5)\*

Product	Price (INR)	Competitor Benchmark	Value Proposition
<b>B2B Extract Powder (1kg)</b>	₹42,000–₹54,000	Chinese extract: ₹28,000/kg	<b>3x bioactive concentration</b>
<b>Stress Capsules (60 caps)</b>	₹1,499	Himalaya StressCare: ₹625	<b>Clinically dosed + Ashwagandha</b>
<b>Altitude Gummies (30 pcs)</b>	₹899	GOQii Altitude Aid: ₹650	<b>Seabuckthorn synergy</b>
<b>Radiance Serum (30ml)</b>	₹3,999	Kama Ayurveda: ₹2,850	<b>High-altitude antioxidant complex</b>

### V. STRATEGIC DISTRIBUTION:

#### 1. Bulk Ingredients:

Exports: Via BENEO (Germany), Sabinsa (US) for global supplement brands.

India: Supply Baidyanath, Organic India for Ayurvedic formulations.

#### 2. Consumer Brands:

Domestic: Nykaa Wellness, PharmEasy, military canteens (CSD).

### 3. Cosmeceuticals:

Luxury spas (Six Senses, Ananda)

Retail: Sephora "Clean Beauty" section, Forest Essentials stores.

## VI. SUSTAINABILITY INNOVATIONS:

Zero-Waste Processing: Spent biomass → compost for Rhodiola nurseries.

Carbon-Neutral Logistics: Solar-powered drying units + electric last-mile delivery in Leh.

Community Benefit Sharing: 20% profits to Ladakh Medicinal Plants Co-op for alpine conservation.

"Shrolo Marpo isn't just an adaptogen – it's Ladakh's biochemical resilience bottled, offering urban societies what Ladakhis have known for centuries: thriving under pressure."

– Dr. Padma Gurmet, Leh-based Ethnobotanist

## 3. DESIRED QUALIFICATION FOR PROMOTER:

Expertise in herbal medicine, nutraceuticals, or agri-processing.

Knowledge of sustainable harvesting practices and GMP (Good Manufacturing Practices).

Experience in export regulations, e-commerce, and Ayurvedic/AYUSH compliance.

## 4. INDUSTRY LOOKOUT AND TRENDS:

Global Trends: Adaptogen market to reach \$23.7 billion by 2030 (CAGR 7.2%).

Local Insight: Rising demand for Himalayan herbs post-COVID; Ladakh's Rhodiola is prized for higher bioactive content due to extreme climatic conditions.

Opportunity: Premium pricing for organic, traceable Rhodiola in the US, EU, and wellness tourism sectors.

## 5. MARKET POTENTIAL AND MARKETING ISSUES:

Potential:

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Global Rhodiola market: \$1.2 billion by 2027 (Allied Market Research).

Domestic demand from Ayurvedic brands (Himalaya, Patanjali) and wellness startups.

Challenges:

Over-harvesting risks threatening wild populations.

Competition from synthetic adaptogens and Chinese Rhodiola.

High certification costs (organic, FSSAI, AYUSH).

## 6. RAW MATERIAL REQUIREMENTS:

Material	Source
Rhodiola roots	Wild harvesting/cultivation in Ladakh
Herbal additives	Local farms (Ashwagandha, Sea buckthorn)
Packaging	Eco-friendly, UV-resistant containers

## 7. MANUFACTURING PROCESS:

Harvesting: Sustainable wild collection or controlled cultivation.

Cleaning & Drying: Solar/Warm-air drying to preserve bioactive compounds.

Extraction: Ethanol/water-based extraction of roots.

Testing: HPLC analysis for rosavin and salidroside content.

Formulation: Blending with carriers/herbs.

Packaging: Aseptic filling in capsules/bottles.

## 8. MANPOWER REQUIREMENT:

Role	Number
Skilled (Botanists, Lab Tech)	4
Semi-Skilled (Processing, Packaging)	8
Unskilled (Harvesters)	10

## 9. IMPLEMENTATION SCHEDULE:

Phase	Duration
Licenses & community agreements	4 months
Facility & nursery setup	5 months
Machinery installation	2 months
Trials & certifications	4 months
Commercial launch	1 month

**Total:** 16 months

## 10. COST OF PROJECT (INR):

Component	Cost
Facility & nursery	60,00,000
Extraction machinery	35,00,000
Working capital	25,00,000
<b>Total</b>	<b>1,20,00,000</b>

## 11. MEANS OF FINANCE (INR):

Source	Amount
Promoter Contribution	48,00,000 (40%)
Bank Loan	60,00,000 (50%)
Government Subsidy	12,00,000 (10%)

## 12. LIST OF MACHINERY REQUIRED:

Machine	Quantity	Cost (INR)
Rotary evaporator	2	15,00,000
Spray dryer	1	12,00,000
Capsule filling machine	1	8,00,000
HPLC Testing Kit	1	10,00,000

### 13. PROFITABILITY CALCULATIONS (YEAR 1):

Metric	INR
Sales Revenue	2,00,00,000
COGS	80,00,000
Gross Profit	1,20,00,000
Operating Expenses	50,00,000
<b>Net Profit</b>	<b>70,00,000</b>

### 14. BREAK EVEN ANALYSIS:

Parameter	Value
Fixed Costs	75,00,000
Variable Cost/Unit	300
Selling Price/Unit	800
<b>BEP (Units)</b>	<b>15,000</b>

### 15. STATUTORY/GOVERNMENT APPROVALS:

FSSAI License for nutraceuticals.

AYUSH Certification (for herbal products).

Organic Certification (NPOP/USDA/EU).

Biodiversity Board approval (Nagoya Protocol).

Forest Department permits (for wild harvesting).

### 16. BACKWARD AND FORWARD INTEGRATIONS:

Backward: Establish community-led Rhodiola cultivation cooperatives.

Forward: Partner with wellness brands, e-commerce platforms (Nykaa, Amazon), and export agencies.

### 17. TRAINING CENTERS AND COURSES:

Centers: National Medicinal Plants Board (NMPB), Ladakh Herbal Research Centre.

Courses: Sustainable wild harvesting, GMP for herbal products (FICCI).

### 18. SUPPLIERS:

For a Rhodiola imbricata (Shrolo Marpo) processing unit in Ladakh focused on producing adaptogen-based herbal products you will need machinery for:

Root cleaning and drying

Grinding/pulverising

Extraction (optional: for tinctures, capsules, teas, and cosmetics)

Packaging and labeling

Below is a curated list of Indian suppliers for machinery tailored to medicinal herb processing, including adaptogens like Rhodiola:

#### **Machinery Suppliers for Rhodiola Imbricata Processing:**

##### **1. Herbal Root Washing & Drying:**

Use: Clean and dehydrate harvested Rhodiola roots while preserving active compounds.

Excel Plants & Equipment Pvt. Ltd. (Pune, Maharashtra)

<https://www.excelplants.com>

Root washers, conveyor dryers, and tray dryers

Specialises in herb and phytochemical processing plants

GMP Herbal Processing Machinery (Ahmedabad)

<https://www.gmpherbals.com>

Herb washers, solar and electrical tray dryers

Known for ayurvedic raw material machinery with stainless steel finishes

##### **2. Grinding, Pulverising & Sieving:**

Use: Convert dried roots into fine powder for teas, capsules, and herbal blends.

Lithotech Engineers LLP (Mumbai)

<https://www.lithotechindia.com>

Hammer mills, pin mills, pulverisers

GMP-grade and pharma-standard machines for herbal powders

Shree Bhagwati Pharma Machinery (Ahmedabad)

<https://www.bhagwatipharma.com>

Fine powder machines, granulators, and sieving units

Suitable for nutraceutical-grade processing

##### **3. Herbal Extraction & Tincture Preparation:**

Use: Extract bioactive compounds (rosavin, salidroside) for adaptogenic products

Hindustan Herbal Products (Delhi)

<https://www.hindustanherbals.com>

Maceration tanks, Soxhlet, percolators, and cold extractors For adaptogen tinctures, decoctions, and concentrates.

K. D. Pharma Machinery Pvt. Ltd. (Mumbai)

<https://www.kdpharma.net>

Herbal extractors and vacuum evaporators

Also provides capsule-filling lines if desired

#### 4. Packaging & Labeling Units:

Use: Tea bags, capsules, powder jars, or tincture bottles

Smart Pack (Indore, MP)

<https://www.smartpackindia.com>

Powder fillers, bottle cappers, tea-bag packaging

Offers compact tabletop machines for startup units

Nichrome India Ltd. (Pune, Maharashtra)

<https://www.nichrome.com>

Automatic pouch packaging (for adaptogenic powder or tea)

Brothers Pharmamach (Mumbai)

<https://www.brothers.in>

Labeling and cartoning machines for wellness/ayurvedic products

Indicative Cost Range (For Small to Mid-Scale Rhodiola Unit)

Equipment	Capacity	Approx. Cost (INR)
Root Washing Machine	100–300 kg/hr	₹1–2.5 lakh
Tray Dryer (Electric/Solar)	24–96 trays	₹2–5 lakh
Pulverizer	20–100 kg/hr	₹1–3 lakh
Herbal Extractor (basic)	50–100 L	₹3–6 lakh
Tea Bag Packing Machine	20–40 bags/min	₹4–10 lakh

Equipment	Capacity	Approx. Cost (INR)
Capsule Filling (semi-auto)	10,000/day	₹2.5–6 lakh
Bottle/Pouch Labeling	30–100 units/min	₹2–5 lakh

#### Procurement Strategy for Ladakh:

Opt for modular and compact equipment to suit remote settings.

Request SS316 pharma-grade material for extractors and drying units.

Ensure suppliers offer cold climate customisation and remote installation support.

Explore schemes under AYUSH Ministry, PMFME, or Startup India for subsidies.

#### Disclaimer:

Only a few training centres are mentioned in the profile, although many are available in the market. The addresses given for centres have been taken from reliable sources, to the best of our knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further, the same have been given by way of information only and do not imply any recommendation.