

## National Mission On Himalayan Studies

### PERFORMA FOR THE HALF YEARLY PROGRESS REPORT

(Period from 1 Apr 2016 to 30<sup>th</sup> Sep 2016)

**Project Title -:** Post-Fire Management in the Pine Forests of Indian Himalayan Region by studying, conserving and distributing culturable microbial biota to increase ecological succession and to revive forest productivity

**Sanction No. and date -:** NMHS/SG-2016/019/382; dated 31/3/16

**Institution Name-:** Shoolini University of Biotechnology and Management Sciences

#### Personal Details -:

<b>Name and Address of the PI-:</b> Prof. Adesh K Saini (PI) Center of Research on Himalayan Sustainability and Development, Shoolini University of Biotechnology and Management Sciences, Post Box No.9, Head Post Office, Solani (HP) – 173212 Tel: 08988205238, email: <a href="mailto:sainiade@gmail.com">sainiade@gmail.com</a>
<b>Name and Address of other PI-:</b> 1. Prof. Kartar S Verma (PI) Dean: College of Forestry, DR YSP University of Horticulture and Forestry, Nauni, Solan, HP. Tel: 09418679022, Email: <a href="mailto:ksvblp16@gmail.com">ksvblp16@gmail.com</a>  2. Dr Anita Pandey (PI) Scientist & Head, Biotechnological Applications Theme GB Pant Institute of Himalayan Environment & Development Kosi-Katarmal, Almora 263 643, Uttarakhand, INDIA Tel: +91- 5962- 241041;FAX: +91- 5962- 241150; Mobile: +919412093858 <a href="mailto:anita@gbpihed.nic.in">anita@gbpihed.nic.in</a> ; <a href="mailto:anitapandey333@gmail.com">anitapandey333@gmail.com</a>

#### Partner Details-:

S. No	Name/ Address	Work assigned to partners	Fund allocated to partners during the period
1.	Prof. Kartar S Verma (PI) Dean: College of Forestry, DR YSP University of Horticulture and Forestry, Nauni, Solan, HP. Tel: 09418679022, Email: <a href="mailto:ksvblp16@gmail.com">ksvblp16@gmail.com</a>	-Data collection for the forest fire in the selected areas for last two years in Himachal region. -Involving the communities for knowing the availability and uses of the microbial resource. -Experiments related to soil rejuvenation. -Statistical analysis of data	Nil
2.	Dr Anita Pandey (PI) Scientist & Head, Biotechnological Applications Theme,	-Guide the student for involving the communities for knowing the availability and uses of the microbial resource.	Nil

	GB Pant Institute of Himalayan Environment & Development Kosi-Katarmal, Almora 263 643, Uttarakhand, INDIA Tel: +91- 5962- 241041;FAX: +91-5962- 241150; Mobile: +919412093858 anita@gbpihed.nic.in; anitapandey333@gmail.com	-Advisor for analyzing the effectiveness of replenishment of microbes and their re-establishment	
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**Project Objectives -:**

1. Analyze the change in microbial biodiversity and soil properties (binding capacity and erosion ability) in the Pine forest after fire outbreak as compared to the nearby unaffected area.
2. Collection, identification and characterization of bio fertilizer and bio control properties of bacterial and fungal microbes and make their repositories based on their geographical location to serve as feeding-bank to revitalize forest soil upon fire.
3. Involving the local panchayats and community people in the collection process to make them aware of the losses occurred due to fire.
4. Test different ways to apply consortium from the repositories bank to the fire affected areas and analyze its cost-effectiveness, feasibility and improvement in the forest productivity and soil parameters as compared to untreated fields.

**Completion in the last six months in % (According to each Deliverables):-**

SI No	Quantifiable Deliverables (as per sanction letter)	Output/ achievements	Performance in terms of Monitoring indicators	Remarks
1	Model depicting increased in the ecological succession after forest fire and reduction in soil loss.	<p>-For achieving the deliverable, we selected Fire affected Pine forest sites (Fig1) and nearby unaffected regions.</p> <p>-160 soil samples were collected comprising burnt and unburnt samples from selected plots (Fig2). Local volunteers were involved for – a) to know about 4 years unburnt area, b) to get guided about local pathways to reach out burnt sites (Fig3).</p> <p>-Microbes in all soil samples were preserved by making glycerol stocks. Isolated microbes were characterized on the basis of colony morphology, gram staining, and catalase/oxidase tests (Fig4).</p>	<p>-After 4 weeks post-fire, we found that there is an average 60-70 % more CFUs in case of burnt sample as compare to less burnt and unburnt sample (Fig 5).</p> <p>-Microbes of burnt area are 80% gram positive rods against unburnt area where 60 % are gram negative.</p>	
2	Increase in the productivity of forest and nearby agriculture ecosystems.	Local community draws resins from Pine trees which got affected due to forest fire (Fig 6a). We also found that grass in unburnt area are more healthier and less sporadic than burnt area (Fig 6b).		Local community told that at many burnt places a non-feedable weed with local name "Ghumber" is coming up.
3	Improved the livelihood of families dependent on milk production.			

4	Guidelines/ manual for field replication in other fire affected forest areas of hilly regions.			
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**Summary of progress -:**

During the month of May we found a total –7 incidents of fire in bajhol, manjholi , Sultanpur, and Seri region of Solan Distt. We observed that some pine forest areas are greatly affected by fire observing crown fires and some faced only ground fire. A total of 10 and 8 number of sites were selected to isolate microbes from burnt and unburnt area respectively. The soil samples were collected and culturable microbes were drawn and glycerol stocks were prepared. Serial dilution from glycerol stock was grown on Nutrient agar media and microbes were analysed microscopically and biochemically. We found that microbes of burnt area are 80% gram positive rods whereas microbes of unburnt area are 60 % gram negative. This suggest that there is a loss of gram negative strains from forest bed owing to fire. Surprisingly we found that CFU of burnt area is more than unburnt area though with less ratio of gram positive strains. Our initial biochemical tests suggest that fire affected area contain mostly Bacillus strains. Our next step is to do the genetic and functional characterisation of microbes to obtain a battery of beneficial strains that can be applied to forest beds. Also, after 4 month of post-fire, we found the quality of grass is poor in burnt area.

**Supporting data files/ maps/ tables/ figures of the results to be attached: Annexure 3**

**Name of the PI-:** Prof Adesh K Saini

**Signature -:**



**Date-:** 24/11/16