

**Associateships:**

The faculty member of this Institution, Dr. Atul Gupta, has research association with Dr. Abhishek Dhiman of Department of Applied Science, Mahatma Gandhi Govt. Engineering College Kotla, Rampur. They are doing research in collaboration on the development of controlled release pesticide devices and the work is mainly comprises of two parts: i.) Synthesis and design of polymeric material which can be used for encapsulating pesticide and ii) Analysing the release of pesticides from these devices. The first part is taken care by Dr. Abhishek Dhiman whereas the second part of the research is supervised by Dr. Atul Gupta. Both Dr. Atul Gupta and Dr. Abhishek Dhiman have conducted the research to develop controlled release devices for the commonly used atrazine herbicide and their work is published in International Research Journal, “Polymer Science, Series A” in this academic Session 2023-24.

## Evaluation of Environment Exposure Potential of Atrazine Herbicide and Synthesis of Polymeric Controlled Release Pesticide Formulations

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**Abstract**—A thorough understanding of pesticide fate in soil and replacement of traditional pesticide formulations with polymeric controlled release pesticide formulations may provide a preventive approach for safer and more effective application of pesticides in the field. In this direction, the present study discusses the soil adsorption study of atrazine herbicide on Indian soil and synthesis of polymeric controlled release formulation based on *Azadirachta indica* (Neem) (AI) leaf powder and sodium alginate. The value of Ground Ubiquity Score (GUS) for atrazine herbicide has been observed 2.58 which classifies it as a transition pesticide in terms of ground water contamination with higher Environment Exposure Potential (EEP) in Indian soil. Polymeric controlled release pesticide formulations (CRPFs) were synthesized by ionotropic gelation method with three different crosslinking ions i.e. Ca<sup>2+</sup>, Ba<sup>2+</sup>, and Al<sup>3+</sup>. These CRPFs have been characterized by FTIR, SEM-EDAX and TGA. Polymeric CRPFs released the herbicide in controlled manner for a period of 300 h and followed non-Fickian diffusion mechanism. AI-Alginate-Ca beads showed maximum cumulative release 14.99 mg/g in 300 h, followed by BaCl<sub>2</sub> and AlCl<sub>3</sub> crosslinked beads. The release study showed that the polymeric CRPFs can be effective in controlling the release and adverse effects of atrazine in the environment.

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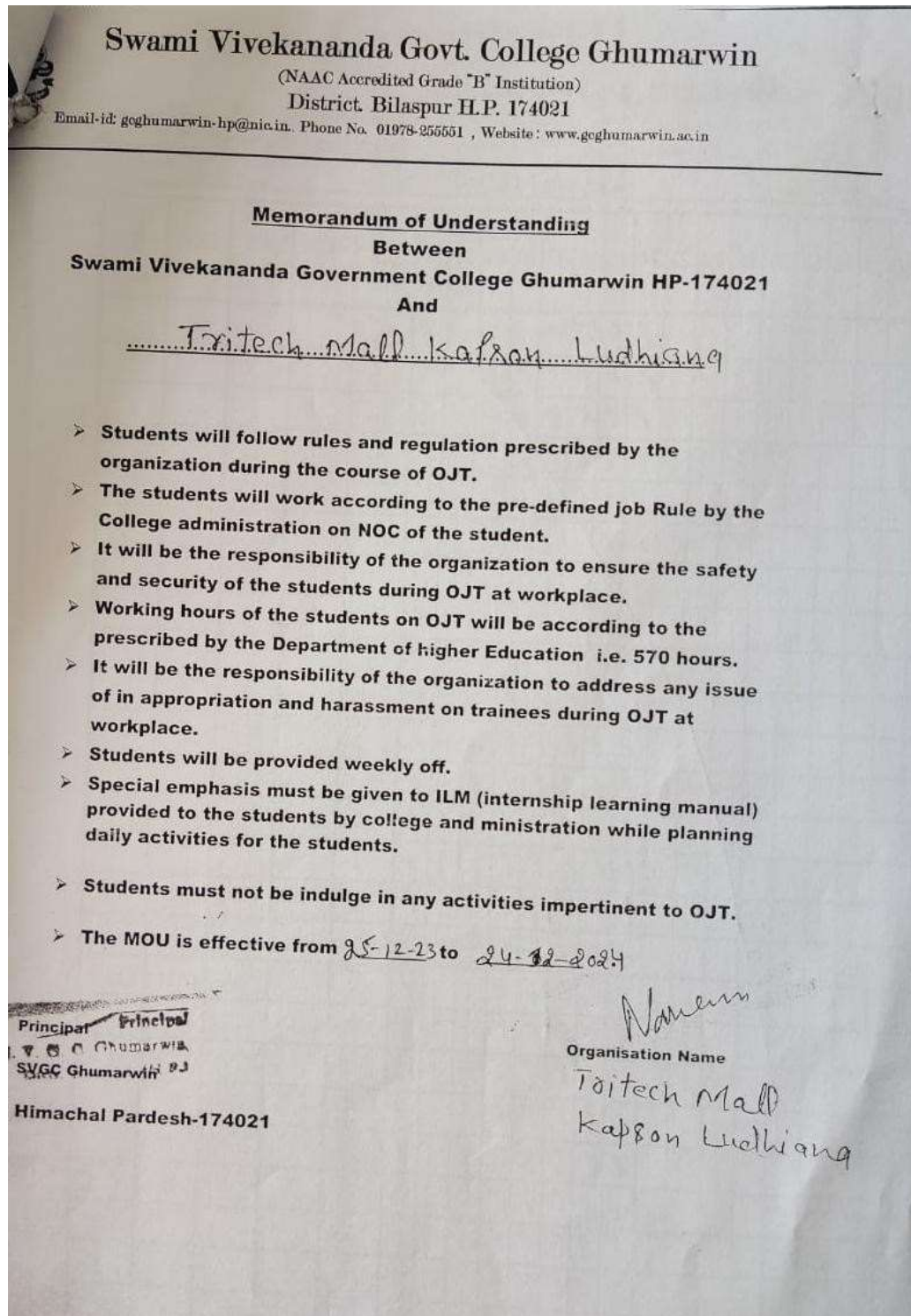
### INTRODUCTION

Farming without usage of agrochemicals like pesticides, is not possible in the modern agricultural practices. Extensive population growth leading to growing food demand, has led to intensify the application of pesticides in fields. Wide application of agrochemicals has led to severe health effects of humans and animals [1, 2]. Despite the dangerous health hazards, the usage of these pesticides cannot be stopped at once. Without using agrochemicals, either the crop is damaged by the herb, pests, fungus or it doesn't have proper growth due to lack essential nutrients in soil. In case of pesticide, less than 5% of the used pesticide actually reaches the target and rest of it goes into the environment. Most of the pesticide used in agriculture seeps into water bodies through leaching and the process of leaching for a pesticide is inevitable [3]. In soil, pesticide may travel in soil solution phase or gets adsorbed to the solid soil particles. This behavior determines the final fate of pesticide and the extent of surface water and ground water contaminations [4, 5].

The agro-environmental pollution derived by pesticide usage can also be reduced with the help of poly-

meric controlled release pesticide formulations (CRPFs). Conventional pesticide formulations release the active ingredient immediately causing quick loss of agrochemicals via degradation, volatilization, evaporation and leaching. An ideal pesticide formulation could be the one which can control the amount available at any time to be adequate for pest control and leave minimum residues on crops and in environment. This can be achieved by the use of polymeric CRPFs [6–9]. Natural origin polymers like alginates have gained attention for synthesis of CRPFs because they not only control the pesticide release in environment but also increase the water holding capacity of soil. In addition to these natural polymers are eco-friendly, cost effectiveness, easily available, biodegradability and may have inherent pest repelling tendency. Alginate is a linear polysaccharide, which easily forms a crosslinked polymer bead with divalent or trivalent metal ion. Alginate is mostly used in combination with another polymer to form bi-polymeric beads [10]. In present case *Azadirachta indica* (Neem) (AI) leaf powder has been used as the second component for bead formation. AI leaf powder is well known for its pest

**Collaboration:** The Institute has collaboration with different Industries to facilitate the on-job-training (OJT) of B.Voc. students.





# S.V. Govt. College Ghumarwin

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No: EDN-SVGC /2023 -

Dated:

## Memorandum Of Understanding

### Between

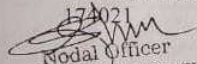
S.V. Government College Ghumarwin

And  
RELIANCE TRENDS GHUMARWIN

- Students will follow rules and regulations prescribed by the organization during the course of OJT.
- Students will work according to the pre-defined job role by the college administration on NOC of the student.
- It will be the responsibility of the organization to ensure the safety and security of the students during on-the-job internship at their respective place.
- Any issue related to health will be addressed by the organization itself during OJT at workplace.
- Working hours of students during OJT will be according to the prescribed laws by the government of India i.e., 40-45 hours per week.
- It is responsibility of the organization to address any issue of misconduct and harassment on trainees during OJT.
- Students will be given week off.
- In case of any major health related issue college Administration must be informed.
- Special emphasis must be given to ILM (Internship learning Map) provided to students by college administration while planning daily activity for the students.
- Students must not be indulged in any activity impertinent to OJT.

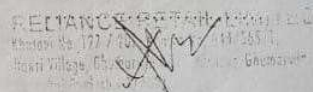
The MOU is effective from 1 July 2023 to 30 June 2024

Swami Vivekanand College Ghumarwin  
Himachal Pradesh

174021  
  
Nodal Officer  
SVGC Ghumarwin

Nodal Officer  
SVGC Ghumarwin

Organization Name

  
RELIANCE TRENDS GHUMARWIN  
Himachal Pradesh 174021  
Ghumarwin

Official Signature

Date



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Between

Swami Vivekananda Government College Ghumarwin HP-174021

And

Lifestyle (State Const, Const)  
F. B. S. (W, Madame)

- Students will follow rules and regulation prescribed by the organization during the course of OJT.
- The students will work according to the pre-defined job Rule by the College administration on NOC of the student.
- It will be the responsibility of the organization to ensure the safety and security of the students during OJT at workplace.
- Working hours of the students on OJT will be according to the prescribed by the Department of higher Education i.e. 570 hours.
- It will be the responsibility of the organization to address any issue of in appropriation and harassment on trainees during OJT at workplace.
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- Special emphasis must be given to ILM (internship learning manual) provided to the students by college and ministration while planning daily activities for the students.
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Principal  
 S. S. V. C. Ghumarwin  
 Dist. Bilaspur (H.P.)  
 Himachal Pradesh-174021

Organisation Name

LIFE STYLE  
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R.B. H. ...