Arbeitsgemeinschaft Tropische und Subtropische Agrarforschung (ATSAF) e.V.
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Junior Scientists Tandems
Final Report

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Title: Using agroecological principles to enhance resilience of polyculture vegetable production in Madhya Pradesh

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I had the valuable opportunity to conduct my research in my home country, India, as part of the JST program funded by the **ATSAF Academy**. This experience was both professionally enriching and personally meaningful, allowing me to engage with development work in a local context while applying academic learning to real-world challenges. I done my research at world vegetable centre South and Central Asia regional office at Hyderabad from October 2024 to March 2025 under the supervision Dr. Ravishankar Manickam and Prof. Dr. Andreas Buerkert. My research topic was '**using agroecological principles to enhance resilience of polyculture vegetable production in Madhya Pradesh**'. The topic is a part of the project 'Healthy soil, prosperous farmer'

About the Project

The challenges facing Indian agriculture are multifaceted, impacting farmers across the nation. With a growing population, diminishing land holdings, rising input costs, dwindling water sources, and soil degradation, farmers are navigating a complex landscape. Climate change exacerbates these challenges, while limited access to extension services and resilient farming technologies further complicates matters. Decreasing land holdings push farmers towards high-yield, input-intensive practices, such as monocropping, hybrid seeds, and chemical fertilizers, which strain natural resources. The indiscriminate use of agrochemicals poses health risks to farmers and consumers alike, with pesticide residues in produce causing detrimental effects. Additionally, the emergence of pesticide-resistant insects necessitates multiple, concentrated spray applications, further escalating environmental and health concerns.

The main objectives of this topic are.

- Implement sound ecological management practices (to reduce harmful chemicals)
- Improve soil health
- Increase the income of farmers and to mitigate climate induced risk.

Location

The working location of my research topic is at Dhar and Jabua district of Madhya Pradesh. The project is implemented in Madhya Pradesh with the support of Solidaridad network in Madhya Pradesh. Dhar district is situated in the Malwa Region-2 in Eastern/Western part of Madhya Pradesh. It has 13 blocks with a total geographical area of 8153 sq.km. The district Dhar is known as a home to Bhil tribe. The tribal land holdings are small and fragmented, undulated with thin soil cover. 65% of total farmers are having less than 2 ha. Land.

District Jhabua is situated in the western part of Madhya Pradesh, in the Malwa region. It is surrounded by hills and forests, characteristic of the landscape of the region. Jhabua falls under the agro-climatic zone of Jhabua Hill Zone., experiencing an average annual rainfall of 840.9 mm, primarily during the

Southwest Monsoon which is received from third week of June. This area features flat to gently undulating topography with a semi-arid to sub-humid climate.

Treatment and major intervention

Polyculture	Intercrop, intra crop, trap crop, Bio-fertilizer, Bio-Pesticides, Traps, repellent crop, Perennial trees
Border crop	Maize, Pigeon pea, African marigold, Cowpea are to be grown to control pest and Diseases
Enriched composting with biofertilizers	Phosphate solubilizing bacteria, *Azospirulum*, Potash Mobilizing bacteria, Zinc Solubilizing bacteria to increase the Nutrient use efficiency
Enriched composting with bio control agents	*Trichoderma viridi, Pseudomonas fluroscence, Beauveria bassiana, Metarhizium anisophili, Paecilomyces lilacinus* for natural control of the pest and diseases
IPM Chilli	Maize, *Sesbania grandiflora*, Innovative organic products for controlling pest in Chilli
Bio mulching	Organic mulch by crop residue of nearby plants or crops stubbles for weed management
Cover crop	Groundnut, Black gram, Green gram, Sunhemp, Daincha are grown to cover soil
Repellent crop	Maize, Castor seeds, African marigold are to be grown in inter and border crop

Fig 1. Polyculture tomato field

Farmer Field school (FFS)

Under the programme five FFS has been set up in both Dhar and Jhabua district. The trained extension team of Solidaridad facilitate the conduct of the training followed by on field demonstration. In this quarter, FFS meeting on topics of integrated nutrient management, integrated pest management, application of biopesticide, Indigenously prepared bio input like Jivamrut, kanda tonic, vermiwash has been conducted under the supervision of subject expert. The trained lead farmers are further disseminating the learnings and skill to non lead farmers. The non lead farmers are also taking active participation in the training and joined field visit to the demonstration and learning the benefits of the regenerative practices.

Fig 2. Interaction with farmers at FFS

Experience

I am especially grateful to my supervisor, other scientific staff at World Vegetable Centre and Solidaridad Network of Madhya Pradesh whose consistent mentorship and field-level insights were instrumental in navigating the practical and cultural aspects of the project. Their support, especially during farmer interactions, helped me gain deeper understanding and build trust with local communities.

I was consistently touched by the welcoming and generous nature of the farmers, who shared their time, knowledge, and hospitality with warmth and sincerity. Their resilience and openness made the fieldwork both educational and emotionally fulfilling. My research focus is on **polyculture vegetable production**, and it was a great learning experience to see how this practice is being implemented in rural areas. I was happy to witness firsthand how farmers are generating higher income through polyculture, diversifying their crops and reducing risk. Their success stories were not only encouraging but also reflected the tangible benefits of sustainable agricultural practices.

In addition to field experience, I also benefited from the online course offered through platform **TwentyOne Skills**, which enriched my understanding of development work and research methodologies. The course content was well-structured and complemented my field learning, helping me critically reflect on my experiences. This experience has been a truly transformative, broadening my knowledge, sharpening my intercultural sensitivity, and deepening my commitment to sustainable development.

Fig 3. With partners of the project ‘Healthy soil, Prosperous farmer’

Fig 4. Along with scientific staff of world Vegetable Centre, Hyderbad

Fig 5&6. Interaction with farmers along with Solidaridad team