



**RESEARCH ROADMAP AT
2021 – 2025**

AGROTECHNOLOGY STUDY PROGRAM

**FACULTY OF AGRICULTURE
UNIVERSITAS SUMATERA UTARA**

FOREWORD

We give thanks to the presence of Almighty Allah, because with His grace and guidance, the Agrotechnology Study Program (PS) of the USU Faculty of Agriculture was able to complete the preparation of the Research and Community Service Road Map for 2021-2025.

This research road map is also intended to guide the development of USU's academic excellence and is a strategic plan in a higher education organization, including how to allocate existing resources based on efficiency and SWOT (strengthen, weakness, opportunity and threat) analysis considerations. The road map is also a policy direction and means of decision making in managing institutional research within a 5 year period.

Thus this road map is presented, hopefully it can facilitate the research/service that will be carried out in the Agrotechnology study program, USU Faculty of Agriculture.

Medan, 29 May 2022

head of the study program,

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CONTENTS

FOREWORD.....	ii
LIST OF CONTENTS.....	iii
1. INTRODUCTION.....	1
1.1. Background.....	1
1.2. Vision and Mission of the Study Program	1
1.3. Research/Service Objectives.....	1
1.4. Scope of Research/Service.....	1
2. SITUATION ANALYSIS AND DEVELOPMENT STRATEGY.....	2
2.1. SWOT analysis.....	2
2.2. Research/Service Development Strategy.....	2
3. LEADING RESEARCH/DEVOTION THEMES.....	3
4. STRATEGIC ISSUES AND RESEARCH/DEVOTION ROADMAP.....	1
4.1. Research/Service Strategic Issues.....	1
4.2. Visualization of Research/Service Roadmap.....	2
BIBLIOGRAPHY.....	1

1. INTRODUCTION

1.1. Background

The research/service road map is a policy direction for research/service management within a period of 5 years (2021-2025). This road map was prepared with the aim of determining and planning in advance the research activities that will be carried out over the next 5 years by taking into account developments in needs, USU's 2015-2039 RPJP, and the direction of national research policy. The road map also functions as a tool to synergize research/service development and align it with stakeholders

In the industrial era 4.0, the very rapid development of science and technology influences various aspects including the economy, energy, environment, ecology and education. Therefore, human resources (HR) have the ability to implement attributes such as confidence, responsibility, creativity, collaborative and team work abilities, honesty, hard work, open mindedness, the ability to reflect and be innovative are very necessary. It is hoped that these human resources will be ready to contribute to national development.

Conditions currently being faced in the context of strong national competitiveness include weak research capacity and competence, development capabilities towards a science and technology-based creation process, institutional and researcher networks that are still local and regional, low productivity and relevance of research results to science and technology needs in the country. community, as well as the still weak research on the use of local natural resources to produce national innovation products that are highly economically competitive.

Based on this, the Agrotechnology study program then prepares a development plan in the field of research/service. The development plan is contained in the form of a study program road map for 2021–2025. This road map is prepared based on the vision of the Agrotechnology study program, which is the crystallization of shared ideals and commitment regarding the ideal future conditions to be achieved by considering existing problems and the potential of the Agrotechnology study program. As a continuation of the 2016-2020 road map, the road map for the next 5 years emphasizes the strategic plan for developing TALENTA's superior fields.

In the book USU's Long Term Plan (2015-2039) the University of North Sumatra has determined the design of the field of competitive advantage, namely TALENTA, which is an abbreviation of: 1. Tropical Science and Medicine, 2. Agroindustry 3. Local Wisdom, 4. Energy (sustainable) , 5. Natural Resources (biodiversity, forest, marine, mine, tourism), 6. Technology (appropriate) 7. Arts (ethnic).

All academics and education staff must have a commitment to realizing the competitive superior field of TALENT through the Tri Dharma of Higher Education activities which includes education and teaching, research, and community service.

1.2. Vision and Mission of the Agrotechnology Study Program

The foundation and direction of development of the Agrotechnology Study Program cannot be separated from the vision, mission and objectives of the study program. The Agrotechnology Study Program, which is one of the study programs under the USU Faculty of Agriculture, supports the vision of the University of North Sumatra (USU), namely "To become a university that has academic excellence as a barometer of scientific progress that is able to compete on a global level".

The vision of the Agrotechnology study program is to become a study program that has excellence and is able to compete in the global world order in developing science and technology for sustainable cultivation of plantation and horticultural crops. Meanwhile, the mission of the Agrotechnology Study Program is:

1. Organizing educational programs in the field of agroecotechnology which provide a forum for developing character and professionalism, as well as being able to develop oneself in accordance with developments in science and technology in the agricultural sector, especially in the plantation sector
2. Producing graduates who are able to compete globally, have an entrepreneurial spirit and are able to develop themselves according to the needs of the work environment, especially in the plantation sector
3. Develop and improve research and community service, as well as serve as a consultancy/information and reference resource for the industrial business world, especially in the fields of plantation, agriculture and agro-industry.

1.3. Research/Service Objectives

The research/service objectives of the Agrotechnology study program are based on the potential available both in terms of resources, as well as facilities and infrastructure, which still refers to the USU Long Term Plan 2015-2039. The outline of USU's research master plan is divided into three groups, namely:

1. Development based on USU's potential and problems in North Sumatra
2. Talent Development
3. Development of the PUI Center for Tuber Studies to take part in regional development and respond to problems in North Sumatra through its participation in developing special supporting research for Sinabung disaster mitigation and adaptation and oil palm development.

Scope of Research/Service

The scope and coverage of the research/service road map includes substance, time span and funding. Time Range The time period for the Agrotechnology study road map is 2021-2025. The substance of the road map for the Agrotechnology study program includes evaluation of the achievement of research development plans based on research achievements in the 2016-2020 period, conditions of changes in the strategic environment, the Vision and Mission of the Agrotechnology Study Program, Faculty of Agriculture and USU, determination of Goals, Targets and Strategies which are then translated into Directions Detailed and measurable research policies and programs.

Financing for the 2021-2025 study program road map activities is an integration of routine financing from USU Non PNPB funds, DIPA DRTPM, Regional Government, BUMN and Private, as well as Industry.

2. SITUATION ANALYSIS AND DEVELOPMENT STRATEGY

2.1. SWOT analysis

Internal	Strength (Strength)	Weakness	SO Strategy	WO Strategy
	<ul style="list-style-type: none"> ● USU's status includes PTNBH with the Mandiri cluster ● North Sumatra University development plan with the competitive advantage of TALENTA. ● The existence of USU's independent funding sources for research/service. ● There are research incentives ● The human resources potential of USU's Agrotechnology Study Program (lecturers, students) are very adequate in number and have different backgrounds but have one vision and mission) ● Tambunan A Garden as a form of supporting TALENTA's competitive advantage. ● Information System Services. ● There is an IT clinic. ● Internal service pattern with one-stop management. ● The existence of research institutions. ● There is an online-based system that makes it easy for researchers and management institutions. ● Accurate and accountable monitoring and evaluation system. 	<ul style="list-style-type: none"> ● USU's policy does not require every study program lecturer to carry out research/service and include it in the lecturer's performance load. ● The research activities carried out are still academic exercises and do not respond sensitively to the reality of needs and/or problems faced. ● Limitations in innovation related to limitations in regulations, systems and infrastructure. ● There has not been optimal and effective cross-multidisciplinary collaboration internally, both within the higher education institution itself, as well as on a national and international scale. ● Information systems including databases have not been fully integrated to support research 	<ul style="list-style-type: none"> ● Optimization of lecturers in national and international scale research to create superior study programs ● Increase and develop research collaboration with industry. ● Utilization of research funds to strengthen institutions, collaboration and quality of research results (output output) with government, private and international institutions. ● Increase the amount of research/service based on TALENTA's competitive advantage according to community needs. ● Adjusting regulations and increasing research in accordance with new normal conditions 	<ul style="list-style-type: none"> ● Strengthening regulations that are well implemented among researchers ● Optimizing collaboration with stakeholders to improve the competency and quality of research output (HR-student lecturers)

	<ul style="list-style-type: none"> • The existence of the PUI Center for Tuber Studies as a forum for research and innovation in tubers 			
External	<p>Opportunity (Opportunity)</p> <ul style="list-style-type: none"> • The potential of the North Sumatra region with biodiversity. • Biodiversity in North Sumatra has the potential to be a source of novel studies. • The need for advanced technology in society • Universities as agents of economic development and mobilization of social principles. • USU as a world class university • Opportunities to partner with universities, research institutions, domestic and foreign, industry, etc. • The availability of large research funds, both local, national and international from government, private and international. • Research opportunities with innovative product outcomes in accordance with community needs. • Changes in regulations in the new normal order. 	<p>Threats</p> <ul style="list-style-type: none"> • Competition between study programs at national scale universities. • The quality of output and innovation resulting from study program research at other HEIs is better • The current economic conditions are not good (pandemic) so the focus of research is less varied and funding support is reduced. • Uncertainty in handling the pandemic affects the availability of materials and tools that support research, dissemination of research results at international scientific meetings abroad is limited. 	<p>SO Strategy</p> <ul style="list-style-type: none"> • Optimizing research collaboration with universities that have better research performance • Optimizing USU's independent funding sources • Developing a variety of research topics that are not laboratory based • Optimization of international scientific meetings by USU for dissemination of research results/outputs 	<p>WO Strategy</p> <ul style="list-style-type: none"> • Optimization of USU's integrated system • Develop research topics based on the results of better research collaborations with other HEIs •

2.2. Research/Service Development Strategy

Based on the SWOT analysis process and USU's RIP targets, it is necessary to carry out strategic programs for planning, implementing and strengthening research/service activities for the Agrotechnology study program at USU in the 2020-2024 period. The research/service development strategy is also prepared based on considerations of research fields and lecturer/researcher resources in the study program, in order to realize the vision of the study program.

The research/service development strategy formulated is as follows:

1. Encourage study program lecturers to increase the number of national and international scale research related to study program participation to support USU to become a world class university.
2. Increase the amount of research based on TALENTA's competitive advantage in overcoming the problem of meeting the needs of society, nation and state.
3. Strengthen study program performance by disseminating information on innovative research results, research results in the form of scientific works and intellectual property rights to support the achievement of maximum research performance.
4. Strengthen upstream and increase the amount of downstream research results from study program lecturers.
5. Encourage the PUI Center for Tuber Studies to increase tuber-based research starting from cultivation, post-harvest to downstream products.
7. Synergize with the Faculty in establishing research collaborations with industries that have research and development divisions.
8. Synergize with the Faculty in increasing service collaboration with the community, UKM, local government to improve progress and welfare of the community

3. LEADING RESEARCH/DEVOTION THEMES

No	Areas of Excellence	Research/Service Theme
1	Tropical science and medicine	<ul style="list-style-type: none"> ● Exploration, conservation and indigenous medicinal plants of North Sumatra
2	Agroindustry	<ul style="list-style-type: none"> ● Food Sovereignty ● Plant cultivation technology ● Land evaluation and area mapping ● Soil fertility and fertilization ● Plant breeding ● Postharvest technology ● Agricultural and food processing technology ● Diversification and food security ● Food biotechnology ● Plantation development ● Exploration, conservation and marketing of North Sumatra's indigenous agricultural products. ● Development of traditional medicinal plants (OHT) and phytopharmaceuticals ● Precision Agriculture, Digitalization of techniques, Agricultural Cultivation
3	Local wisdom	<ul style="list-style-type: none"> ● Economic development of indigenous agricultural actors
4	Energy (sustainable)	<ul style="list-style-type: none"> ● Utilization of agricultural or plantation waste
5	Natural resources (biodiversity, forest, marine, mine, tourism)	<ul style="list-style-type: none"> ● Biodiversity of local natural resources ● Agroforestry ● Ecology and environmental management ● Preservation, Utilization and Development of Nuftah Plasma (plants, animals and indigenous microbes) ● Ethnobotany of North Sumatra ● North Sumatra ornamental plants ● Preservation of germ plasma ● Pure culture collection ● Biological modeling ● Flora and fauna biotechnology ● Environmental and tourism management policies and regulations

6	Technology(appropriate)	• Development of information technology transfer in the agricultural sector
7	Arts (ethnic)	•

4. STRATEGIC ISSUES AND RESEARCH/DEVOTION ROADMAP

4.1. Research/Service Strategic Issues

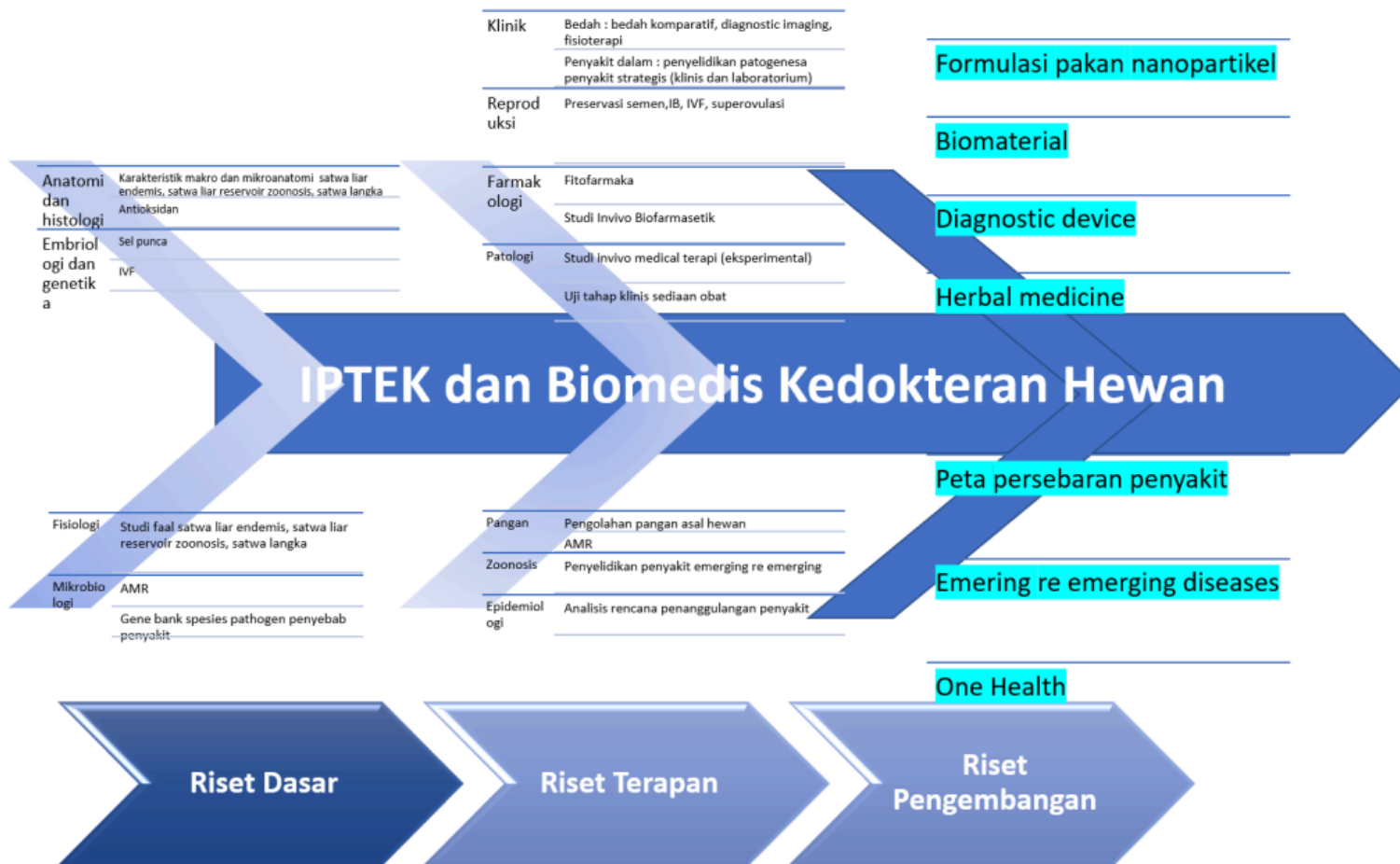
Research/service theme	Strategic Issues	Research/Service Study Roadmap				
		2021	2022	2023	2024	2025
Agroindustry	Climate change, modeling, and Engineering	Reduce local and global climate change risks to food security, fiber and fuel production.	Reduce long-term rates of global climate change by increasing carbon and nitrogen storage in soil, products and plants.	A comprehensive, broad-based model to assess the socioeconomic impacts, risks, and opportunities associated with global climate change and extreme climate events on agriculture and natural resources.	Integrate long-term weather forecasting, market infrastructure, crop and livestock management systems to quickly optimize domestic food availability, fiber and fuel production in response to global climate change.	Minimize the long-term effects of global climate change on crop production, livestock, forests and natural resource systems.
Agroindustry	Agricultural Policy and Technology	Seed, seedling, fertilizer, agricultural tools	Local resource-based technology in	Biotechnology in the food sector is capable	Institutional cooperation model between	Anticipatory and responsive agricultural

		and machinery technology, control of plant pests (OPT) and livestock, as well as post-harvest technology in order to support increased production, added value, competitiveness and exports.	the provision and multiplication of seeds, seedlings, fertilizer, various medicines, agricultural tools and machinery, post-harvest technology, and biotechnology.	of anticipating global climate change, pest disturbances, as well as technology user preferences in the context of increasing production, food diversification, added value and competitiveness.	business actors to disseminate innovation and institutional results to farmers and users in a proportional manner to support the development of industrial agricultural systems.	development policies to support the development of industrial agricultural systems, as well as increase farmers' income and welfare.
Natural resources (biodiversity, forest, marine, mine, tourism)	Utilization of local (microbial) biodiversity	Isolation of microbes from the environment and assay of their utilization; Assay of crude enzyme activity on various substrates	Testing microbes as biofertilizers, biopesticides, bioremediation agents (assays in polybags or lab/pilot scale)	Microbial propagation uses various types of agricultural waste and variations of N and P	Microbial field assay	Isolation and characterization of genes responsible for the ability of microbes as biopesticides, biofertilizers, bioremediation agents and enzymes
Natural resources (biodiversity, forest, marine, mine, tourism)	Utilization of local biodiversity (plants)	Inventory of various ethnobotanical plants; Inventory	Inventory of ornamental plants and their possible uses	In vivo and invitro propagation;	In vivo and invitro propagation	Improvement of cultivation methods; Improvement of

		of local agricultural plants				cultivation methods
Technology	Changes in the order of ecosystems and the environment due to human activities	Study of native and artificial ecosystems (agricultural, plantation, aquatic ecosystems, etc.)	Study of native and artificial ecosystems (agricultural, plantation, aquatic ecosystems, etc.)	Study of native and artificial ecosystems (agricultural, plantation, aquatic ecosystems, etc.)	Model design from the data obtained	Model design from the data obtained

4.2. Visualization of Research/Service Roadmap





Example

BIBLIOGRAPHY

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