Biosecurity and Biodiversity
Keys to Promoting Local Food for Food Security and Food Sovereignty

Collected papers
Salatiga, February 2019
Biosecurity and Biodiversity

Keys to Promoting Local Food for Food Security and Food Sovereignty

Collected papers
Salatiga, February 2019

Editors: John Lovett
Titi S. Prabawa
Linda Susilowati
Ian Falk
About biosecurity and biodiversity and APBSF

The Australian Plant Biosecurity Science Foundation supports plant biosecurity research, development, extension and capacity building, particularly focused where there is a need for investment in environmental, capacity building, international linkages, non-levy payer, cross-sectoral and strategic plant biosecurity research. The Foundation was established to follow the Plant Biosecurity Cooperative Research Centre (PBCRC) which finished operations in June 2018.

Plant Biosecurity is a set of measures designed to protect a crop, crops or a sub-group of crops from emergency plant pests at national, regional and individual farm levels. Plant Biosecurity is a global issue. Harmful plant pests and diseases can impact on our unique environment and biodiversity, food safety, agricultural trade and market access.

In this proceedings, biosecurity has an additional meaning: namely, the use and cultivation of Indonesian native plant resources, not only to prevent extinction of that genetic material through being overlooked and possibly cleared, but also to reduce reliance on imports of non-indigenous grains which potentially carry pests and diseases.

Cite this proceedings as:

©Australian Plant Biosecurity Science Foundation 2019
The material in this publication is licensed under a Creative Commons Attribution 4.0 International licence, with the exception of any images and photographs. That is, papers can be reproduced freely (but not modified nor used for commercial purposes), and must be attributed to this publication as their source. For details of the Creative Commons licence CC BY NC ND, visit http://creativecommons.org.au/learn/licences/.

This proceedings is available online via:
Australian Plant Biosecurity Science Foundation
info@apbsf.org.au
For inquiries, phone 0419 992 914.

Financial supporters and organisations providing in-kind support
- The Crawford Fund, https://www.crawfordfund.org/
- Universitas Kristen Satya Wacana (UKSW)
- CABI, https://www.cabi.org/
- Qaryah Thayyibah Farmer Groups Association, Salatiga, Indonesia (QT)
- Indonesian Biosecurity Foundation (IBF), https://biosecurity.id/
- Centre of Excellence for Biosecurity Risk Analysis (CEBRA), The University of Melbourne, https://cebra.unimelb.edu.au/
- Universitas Mahasaraswati, Denpasar (UNMAS)
- Universitas Sam Ratulangi (UNSRAT)
Participants provided in-kind return transport and accommodation. (See list of Participants on pages vi–vii.)
CONTENTS

Foreword
Presenters and Participants
Program

LOCAL FOOD AND BIODIVERSITY
1. Fast action in saving local plant biodiversity in Salatiga to support food security
   – Andreas Sukmana
2. Local legumes for food security on Timor Island, East Nusa Tenggara – Dhanang Puspita
3. Rescuing and preserving local vegetable varieties as genetic resources through collaboration
   between a genebank, local communities and universities – Muhamad Taufik Hariyadi
4. Utilization of Andaliman for local food diversification and empowerment of Andaliman farmers
   – Yudhi V. Simorangkir
5. Collection, conservation, and utilization of Indonesian local genetic resources to support plant
   breeding programs and promote food security – Wahyono, SP

FOOD SECURITY, FOOD SOVEREIGNTY AND FOOD SAFETY
6. Approaches to food security should not conflict with achieving food sovereignty
   – Achmad Darojat JK
7. Plant biosecurity and food safety – flour milling industry’s perspective
   – Muhammad Dudi & Naila Huriati
8. Biosecurity planning for wheat from the origin country to Indonesia
   – Zainal Andi Kusuma & Bhakti Yudha Prawira
9. Biosecurity: strengthening community awareness and capacity-building for food sovereignty
   – Agnes Cela Purwani
10. Farm biosecurity plans: preventing pests, diseases and weeds in rice fields of Salatiga to ensure
    food security – Rohning Sulistyani
11. Biosecurity risk analysis: an overview – Susie Hester

CASH CROPS, FOOD CROPS, TRADE AND MARKET
12. Mocaf (modified cassava flour) for food diversification in Indonesia
    – Hayuningtyas Dyah Cressidawati
13. Empowering housewives in processing raw materials from yields into food to strengthen
    local/domestic economy in Ketanggi village, Salatiga – Lina Mardliyah & Mujab
14. Utilization of by-product from small beef floss industries into potentially commercial food
    product – Monika Rahardjo & Mayer Tin Ting Sirenden
15. Use of information technology on organic farming to increase the interest of young people to
    become farmers – Shofyan Adi Cahyono

FOOD MANAGEMENT, FARMING SYSTEMS AND THE ROLE OF GOVERNMENT
16. Implementation of the integrated farming system through field schools to achieve the Sustainable
    Development Goals (SDGs): Case study in Kalibening Salatiga Central Java
    – Endang Dwi J
17. Corn challenges in Madura – Niken Widya Palupi
18. Bio-organic fertilizer for soil health and rice security in Indonesia
    – Wilhelmus Terang Arga Sanjaya
19. Education, training and community awareness: a case study of capacity building in Bali’s
    irrigation system – Ni Gst. Ag. Gde Eka Martiningsih
20. Pest control through multiple cropping systems in Gunung Kidul Regency: a qualitative study
    – Risya Pramaha Situmorang
21. Emerging biosecurity and biodiversity in oil palm plantations: a case study from Ketapang,
    West Kalimantan – Slamet Haryono

INDEX

Regional Master Class in Plant Biosecurity | 10–16 February 2019, Salatiga
FOREWORD

In the on-going national and international debate and discussion about meeting the global imperatives of securing food security and food sovereignty, a vital objective is that regional and local connotations, challenges and opportunities shall be very much ‘front of mind’.

The International Master Class (IMC) in Plant Biosecurity held in Denpasar, Bali, in January 2018 brought together participants from many parts of the vast Indonesian archipelago. One of the principal outcomes of two weeks of concentrated activity was the overwhelming support for projecting biosecurity thinking into Indonesian regions. This was seen as a cost-effective way of facilitating out-reach, thus achieving the objective.

The network which was established following the Denpasar IMC has remained very active, generating several proposals for Regional Master Classes (RMC). Universitas Kristen Satya Wacana based in Salatiga, Central Java, has long been a participant in bilateral activities between Indonesia and Australia and offered to host the first RMC on a cost-sharing basis with The Crawford Fund and the Australian Plant Biosecurity Science Foundation.

Representatives of the Centre for Agriculture and Bioscience International (CABI), the Centre of Excellence for Biosecurity Risk Analysis (CEBRA), the Indonesian Biosecurity Foundation (IBF), and Yayasan Qaryah Thayyibah (a farmer cooperative) made significant contributions to the RMC Program through their presentations and contributions to analysis of outputs and outcomes. Emphasising the regional focus, invaluable input was made by a number of local speakers.

All the Participants declared their experience an unqualified success, confirming that a shorter, focussed Master Class could deliver considerable benefit. Each Participant had prepared a case study before the RMC and undertook to draft brief papers concerning completed, current or proposed work. These papers would be published and would complement the formal reports made to the co-funders. This proceedings is the result.

In addition to highlighting key aspects pertaining to food security and food sovereignty, the RMC (i) helped to grow the network established following the IMC of 2018; (ii) raised the profile of the Indonesian Biosecurity Foundation as a peak body for the nation; (iii) further strengthened bilateral ties with Australia; and (iv) through CABI, cemented linkages to the rest of the biosecurity world.

A second RMC is in the planning stage. It will follow the Salatiga model and we look forward to its success and to those of other RMCs which may follow.

The Editors: JOHN LOVETT
TITY S. PRABAWA
LINDA SUSILOWATI
IAN FALK

Canberra, Salatiga and Darwin, May 2019
PRESENTERS

Mr Bahruddin     Founder, Yayasan Qaryah Thayyibah (Serikat Paguyuban Petani/Farmer Association), Kalibening, Salatiga.

Dra. Lusiaiwati Dewi, M.Sc.  Senior Lecturer in Biology, Universitas Kristen Satya Wacana, Salatiga.

Professor Ian Falk  Supervisory Board, Indonesian Biosecurity Foundation.

Dr Susan Hester  Senior Research Fellow, Business School, University of New England, Armidale, NSW; Deputy Director, Centre of Excellence for Biosecurity Risk Analysis (CEBRA).

Theo Litaay, Ph.D.  Senior Policy Adviser in The Executive Office of The President, Republic of Indonesia.

Professor John Lovett  Chair, Australian Plant Biosecurity Science Foundation (contributor, unable to present).

Dr Eka Martiningsih  Secretary, Indonesian Biosecurity Foundation; Senior Lecturer in Agriculture, Universitas Mahasaraswati, Denpasar, Bali.

Dr Wiske Rotinsulu  Senior Lecturer in Agriculture and Head of International Affairs at Sam Ratulangi University, Manado, Sulawesi.

Dr Sivapragasam  Regional Director of CABI, Malaysia.

Dr Drs. I Made Sukamerta, M.Pd.  Rector, Universitas Mahasaraswati, Denpasar, Bali.

Dr Suryasatriya Trihandaru  Vice Chairman, Indonesian Biosecurity Foundation; Pro-Vice Chancellor (Research), Universitas Kristen Satya Wacana, Salatiga.

Ms Dina Banjarnahor M.Sc.  (Moderator) Universitas Kristen Satya Wacana, Salatiga.

Dr Yohanes Martono M.Sc.  Universitas Kristen Satya Wacana, Salatiga (contributor, unable to present).

Image courtesy of Linda Susilowati
PARTICIPANTS

Mr Shofyan Adi Cahyono is a young entrepreneur in an organic farming business named Sayur Organik Merbabu Farm. He is also currently taking his Master degree in Agriculture at Universitas Kristen Satya Wacana. Mr Cahyono is organising young farmers to manage organic farming businesses and encourage youth in his areas to be resourceful farmers.

Mr Yudhi Vane Stephan Simorangkir is a student of the Postgraduate program in Development Studies in Universitas Kristen Satya Wacana. He is actively working as a coordinator in Gerakan Mahasiswa Kristen Indonesia (GMKI-Indonesian Christian Student Movement, a youth not-for-profit organisation that consists of Christian students from various regions in Indonesia). His work is related to indigenous crops from Sumatra named Andaliman.

Mr Bhakti Yudha Prawira is a staff member in Jetty and Silo Operation Department from PT Indofood Sukses Makmur, Bogasari Flour Mills Division, Jakarta. He is actively working on monitoring the quality of wheat production in Bogasari, including pests and diseases management.

Mr Muhammad Dudi Salmon Bayu Aji is a Section Head of Milling from PT Indofood Sukses Makmur, Bogasari Flour Mills Division, Jakarta. His work is related to food safety management progress. Some of his activities are leading his team on flour mixing, retail packaging, and premium packing.

Mr Wahyono is a Genetic Resources Officer from PT East West Seed Indonesia, West Java. His main responsibility is to provide genetic materials in order to support the breeding programmes. His works are related to plant breeding, DNA extraction, plant genomics, and genetic engineering.

Mr Muhamad Taufik Haryadi is a Genetic Resources Officer from PT East West Seed Indonesia, West Java. He is actively working on collecting genetic materials around Indonesia, exchanging genetic materials from International Gene Banks, and conserving genetic materials through rejuvenation.

Mr Slamet Haryono is a Senior Assistant Manager on Plasma Support from PT Austindo Nusantara Jaya Agri. He is also currently taking his Master degree in Sociology at Universitas Sumatera Utara. His works are related to oil palm plantations, especially in West Kalimantan.

Ms Maria Matoetina Suprijono is a lecturer in Nutrition and Food Biochemistry from the Faculty of Agriculture Technology, Universitas Katholik Widya Mandala, Surabaya. Her background is in Community Nutrition and Food Science. She focuses her research and teaching in Food Nutrition, Food Biochemistry, Nutrition Evaluation, Nutrient Formulation and Fortification. She is a member of the Indonesian Association of Food Technologists. (Unable to attend.)

Mrs Lina Mandliyah is a farmer and member of Serikat Paguyuban Petani Qaryah Thayyibah (SPPQT – Qaryah Thayyibah Farmer Groups Association). As a member of SPPQT she has a role on women empowerment programs in her village. Her ongoing program is to empower housewives from her village to have ability to process raw materials into various products.

Miss Hayuningtyas Dyah Cressidawati is a farmer and member of Serikat Paguyuban Petani Qaryah Thayyibah (SPPQT – Qaryah Thayyibah Farmer Groups Association). Her work is related to the production of alternative local food. She is currently working on alternative healthier flour substitution from cassava named Mocaf flour.

Miss Endang Dwijayanti is a farmer and member of Serikat Paguyuban Petani Qaryah Thayyibah (SPPQT – Qaryah Thayyibah Farmer Groups Association). She is currently working on organic farming management for her village through SPPQT.
Participants, continued

Miss Agnes Cela Purwani is a farmer and member of Serikat Paguyuban Petani Qaryah Thayyiubah (SPPQT – Qaryah Thayyiubah Farmer Groups Association). Her works are related to community awareness, capacity building, and integrated farming systems.

Mr Achmad Darojat Jumadi Kubro is a farmer and member of Serikat Paguyuban Petani Qaryah Thayyiubah (SPPQT – Qaryah Thayyiubah Farmer Groups Association). His works are related to integrated farming systems, food production, and capacity building.

Mrs Niken Widyuningtyas is a program officer on training and development from Swisscontact Indonesia. She is also currently taking her doctoral degree in the Faculty of Agricultural Technology at Universitas Gadjah Mada, Yogyakarta. Her works are related to green production, market development, supply chain, and technology food-nutrition.

Mrs Rohning Sulistyani is on the extension staff from Department of Agriculture, Salatiga City Government. Her major work is on pests and diseases management. She is also working with local farmers and other stakeholders to develop an agritourism spot in Salatiga.

Mr Willemus Terang Arga Sanjaya is a doctoral student in Microbiology, Department of Soil Science and Land Resources, Institut Pertanian Bogor, West Java. His current work is about bio-organic fertilizer for soil health and rice security.

Mr Dhanang Puspitas is a Lecturer in Food Technology, Faculty of Medicine and Health Science, Universitas Kristen Satya Wacana. His research interests include natural pigments, food innovation, and food microbiology.

Mr Andreas Binar Aji Sukmana is a Lecturer in Microbiology, Faculty of Biology, Universitas Kristen Satya Wacana. His works are related to local food, microbiology, and biodiversity.

Mr Risya Pramana Situmorang is a Lecturer in Faculty of Biology, Universitas Kristen Satya Wacana. His works are related to biology education, food management, and farming systems.

Miss Monika Rahardjo is a Lecturer in Food Technology, Faculty of Medicine and Health Science, Universitas Kristen Satya Wacana. Her works include food technology, local crops, and food management.

Participants' locations, ‘Regional Master Class in Plant Biosecurity 2019’
MASTERCLASS PROGRAM, 11–16 FEBRUARY 2019

Day 1 – 11 February 2019 (Monday)
08.00 – 09.00 Registration & Briefing about the program.
09.00 – 09.30 Opening Ceremony: Rector UKSW.
09.30 – 10.30 Orientation of Master Class and discussion of desired outcomes, led by Professor Ian Falk & Dr Titi Susilowati.
11.00 – 12.30 “What is biosecurity?”: interactive discussion with the participants, led by Prof. Ian Falk & Dr Susie Hester.
14.45 – 15.30 Participants’ presentations.
15.30 – 16.30 “Biosecurity policy development in Indonesia”, led by Theo Litaay, Ph.D.
16.30 – 17.30 Concurrent sessions (3): responses to biosecurity issues raised from the opening addresses and Participants’ presentations, moderated by Ms Dina Banjarnahor, M.Sc.

Day 2 – 12 February 2019 (Tuesday)
08.30 – 09.00 Review of previous day’s activities, led by Prof. Ian Falk.
09.00 – 10.30 “Biosecurity risk”, by Dr Susie Hester.
11.00 – 12.30 “Biosecurity response”, by Dr Susie Hester.
14.00 – 15.30 Simulation exercises, led by Dr Susie Hester.
16.00 – 17.00 Group exercises concluded.

Day 3 – 13 February 2019 (Wednesday)
08.30 – 09.00 Review of previous day’s activities, led by Dr Susie Hester.
09.00 – 10.30 “Biosecurity, food security and food sovereignty”, by Dr Sivapragasam.
11.00 – 12.30 “Trade and market access”, by Dr Sivapragasam.
14.00 – 15.30 Group exercises, led by Dr Sivapragasam.
16.00 – 17.00 Simulation exercises concluded.

Day 4 – 14 February 2019 (Thursday)
08.30 – 09.00 Review of previous day’s activities, led by Dr Sivapragasam.
09.00 – 10.30 “Community involvement to strengthen food security in Indonesia”, by Mr Bahruddin.
11.00 – 12.30 “Education, training, and community awareness: capacity building: case study in Subak Bali”, by Dr Eka Martiningsih.
14.00 – 15.15 “Local food to contribute to food security”, by Dr Wiske Rostinsulu.
15.45 – 17.00 “Local foods for food security and food sovereignty”, by Dra. Lusiawati Dewi, M.Sc.
17.00 – 17.45 Discussion groups (3), led by Ms Dina Banjarnahor, M.Sc.

Day 5 – 15 February 2019 (Friday)
08.30 – 09.00 Review of previous day’s activities, led by Dr Titi Susilowati.
09.00 – 10.30 “What happens when things go wrong?”, by Dr Sivapragasam.
11.00 – 12.30 “The value to universities and other institutions of collaborating with IBF”, by Dr Suryasatria Trihandaru and Dr Drs. I Made Sukamerta, M.Pd.
14.00 – 15.30 Future contributions to biosecurity and biodiversity by Participants, led by Ms Dina Banjarnahor, M.Sc.
16.00 – 17.30 Feedback: Consideration of papers to be produced from Master Class, led by Prof. Ian Falk.

Day 6 – 16 February 2019 (Saturday)
08.30 – 09.00 Review of the week’s activities, led by Dr Sivapragasam.
09.00 – 10.30 “Where to next?”, led by Dr Titi Susilowati, Prof. Ian Falk and Dr Sivapragasam.
11.00 – 12.00 Closing Ceremony and presentation of Master Class Certificates.
FOOD MANAGEMENT, FARMING SYSTEMS AND THE ROLE OF GOVERNMENT

16. Endang Dwi J. Implementation of the integrated farming system through field schools to achieve the Sustainable Development Goals (SDGs): Case study in Kalibening Salatiga Central Java.


Images courtesy of Mr Bahruddin (above) and Agnes Cela Purwani (left above & below).
19. EDUCATION, TRAINING AND COMMUNITY AWARENESS: A CASE STUDY OF CAPACITY BUILDING IN BALI'S IRRIGATION SYSTEM

Ni Gst. Ag. Gde Eka Martiningsih

Agriculture Faculty of Universitas Mahasaraswati, Denpasar, Bali, Indonesia
ekamartinii@gmail.com

Abstract
Capacity building is the process by which individuals, groups, organizations, institutions and societies increase their ability to perform core functions, solve problems, understand needs in a broader context and think about sustainability matters. Capacity building embeds personal responsibility and recognition of individual obligations that come from awareness of environmental issues. This is strengthened by interactions with people who have similar interests. Awareness of environmental issues drives activities that help environmental preservation and will also affect the sensitivity of the community to biological security, food security and food sovereignty. This article is related to the goals of the Indonesian Government to reach these objectives, and discusses the role of intergenerational capacity building in the Balinese water irrigation system called ‘subak’.

Keywords: food security, food access, food sovereignty

Abstrak

Kata kunci: ketahanan pangan, akses pangan, kedaulatan pangan

Introduction
Over the period 2015–2020 Indonesia will face many complex development challenges, especially in relation to poverty and food security. The national target is to increase food supply and sovereignty. Some basic programs have been envisioned and implemented, starting in 2015, and are expected to be achieved by 2020. The Indonesian Government has increased its focus on organic farming programs by strengthening farmer groups and agricultural organizations. Some of these programs are implemented throughout the provinces in Indonesia. In Bali Province, subak, or traditional water irrigation management, is the focus of this strengthening.

Approach
This study is based on field data and focus group discussions with subak personnel. Questions were posed to subak leaders, other traditional leaders and farmers about the opportunities and challenges in preserving agricultural resources in particular and the environment in general. A key question was how plant management can be carried out in the field so that the concept of environmental preservation based on the traditional philosophy of Tri Hita Karana (‘three causes of well-being’ or ‘three reasons for prosperity’) can be promoted. Informants were asked to sign the informed consent form if they agreed to be interviewed in this study. The interview process was started after getting their permission. The process was voice recorded. The data obtained were tabulated and analyzed (thematic analysis according to Creswell). The respondents’ themes were then edited, and grouped into themes and concepts.
Discussion

From all the informants interviewed there were seven themes with varying numbers of responses.

- Thirty per cent of informants answered ‘strongly agree’ that implementing the Tri Hita Karana principles and providing training in biosecurity and food security would improve sustainable management and food security with environment preservation.
- Twenty-five per cent said they ‘agreed’ and were convinced of the sustainability of food security and environment preservation with the ongoing assistance and empowerment of farmers.
- Seventeen per cent replied ‘agreed’ but were not sure of the statement about agriculture resources and environmental preservation.
- Fifteen per cent answered ‘agreed’.
- Five per cent answered ‘not sure’ that the traditional philosophy could be implemented in the field.
- Five per cent of informants did not agree about the philosophy of Tri Hita Karana.
- The remaining three per cent did not answer or abstained.

Only the first two themes are discussed now. It can be seen that the largest theme is sustainable management and training. This theme supports the finding that the informants believe that the implementation of Tri Hita Karana is very important in preserving the subak resources and environment. The second most significant theme is the action of assistance and empowerment of farmers in biosecurity and food security management. This is important in the capacity building of human resources of subak.

Overall, the research supports the finding that for preserving subak resources and environment the government and all elements that are related to this action have to support empowering subak through farmers. Assistance and training in implementation of the Tri Hita Karana philosophy are very important to accelerate capacity building of subak’s human resources.

The findings support the research of Kaler et al. [2] who found that biosecurity management is built into the system of subak in Bali, and that its importance and principles are generalizable to other locations in Indonesia, and might also be appropriate in other locations internationally. The fundamental concepts are that culture is a tool, in the Balinese example, which is used to optimize food production. This involves synchronization of cultural rituals, water irrigation through different rice fields in the subak system and subsequent biosecurity processes of plant pest disease management to reduce losses. This ensures effective management of biosecurity through the practice of sustainable farming, to achieve economic welfare and social inclusion without degrading environmental quality. Disturbance and stress may occur at any time in the agricultural cycle, but informed farmers have resilience to move forward to reach a new equilibrium through developing new science and technologies as well as through adopting new policies.

Subak is a remarkable model for place-centred and inter-generational education and training, and for providing youth the opportunity to develop their competence based on collaboration, experience and community service. Furthermore, it can be explained that in subak organizations the concept of sensitivity and alertness to the environment is closely related to the philosophy of Tri Hita Karana so that it is an obligation for each subak member to carry out environmental training and food sovereignty. Thus, capacity building in subak organizations is strongly influenced by Tri Hita Karana: promoting an harmonious relationship between the natural and spiritual worlds, through an intricate series of rituals, offerings and artistic performances. Subak is a democratic and egalitarian system focused on water temples and the control of irrigation that has shaped the landscape over the past thousand years. Water temple networking ceremonies are associated with the practical management of water, crystallising the precepts of the Tri Hita Karana.

In short, the case of the Balinese subak water management system as a model for place-based intergenerational capacity building provides an important example of how cultural practices can
support and strengthen agricultural and food security outcomes by ensuring that cultural rituals and activities accompany each step in the agricultural cycle. In the Balinese case, these rituals and activities are passed on through place-based capacity building to ensure that sound biosecurity practices occur as part of this integrated process, including weed and pest management.

Future work
To promote community awareness about the need to preserve the environment, a strategy is required which involves the community more fully in biosecurity activities as part of capacity building. Additional capacity building activities will prepare more youth to deal with a diversity of interlinked, complex issues. An example is to develop more specific biosecurity strategies, as posed by Meyerson & Reaser⁴. These strategies would include prevention and early detection of, as well as rapid response to, harmful and potentially harmful organisms.

References and further reading
INDEX of keywords and others, by paper number

added value, 13
Andallman, 4
Bali, 19
Batak, 4
beef broth, 14
beef floss, 14
biodiversity, 1, 3, 5, 18, 21
biosecurity, 4, 7, 9, 10, 11, 19
farm, 10
oil palm, 21
planning, 8
budget allocation, 11, 13
capacity building, 9, 13, 19
cassava, 1, 12, 20
collaborative sustainability action, 21
collection, 1, 3, 5
commercial food product, 14
community awareness, 1, 9, 13, 19
Community Service Program, 3
conservation, 1, 5, 21
nature, 16
contamination, 7, 8
corn, 2, 13, 17, 20
cropping systems, 20
  integrated farming, 16
  organic farming, 15, 18
  rice farming, 16, 18
subak system, 19
cultural attitudes, 17
cultural practices, 19
diseases, 8, 9, 10, 20
East Nusa Tenggara, 2
economic value, 1, 3
education, 9, 17, 19
empower farmers, 4
empowering, 3, 13
farm biosecurity, 10
fertilizer, 6, 15, 16, 18
field school, 16
flour, cassava, 12
legume, 2
medium protein, 14
wheat, 7, 8, 12
flour milling industry, 7
food, access, 19
diversification, 4, 12
safety, 7, 8
security, 1, 4, 5, 6, 12, 14, 15, 19, 21
sovereignty, 6, 9, 19
waste, 14
fumigation, 7
genebank/genetic bank, 3, 5
 genetic resources, 1, 2, 3, 5
 government, 4, 8, 11, 13, 17, 18, 19
 harvest, 13
 information technology, 15
 instant cream soup, 14
 Integrated, farming system, 16
 pest management, 8, 9
 interview(s), 2, 12, 17, 18, 19, 21
 invasive alien species, 11
 irrigation, 19
 legumes, 2
 local, genetic resources, 5
 knowledge, 20
 plants, 1, 2, 4
 (plant) varieties, 3
 loss/extinction, 1, 3
 Madura, 17
 management, 18, 19
 integrated pest, 9
 post-harvest/production, 13
 risk, 11
 market/marketing, 1, 2, 4, 5, 11, 13
 market prices, 2, 12
 online, 15
 microorganisms, 6, 7, 16
 mocaF, 12
 nature conservation, 16
 nutritional value, 1, 2, 14
 oil palm, 21
 biosecurity, 21
 online marketing, 15
 orangutan, 21
 organic farming, 6, 15, 18
 pests, pest control, 6, 7, 8, 9, 10, 11, 20
 phosphine, 7
 plant breeding, 5
 post-harvest management, 13
 preservation, 1, 3, 18, 19
 prevention, 10
 prioritization, 11
 processed, processing, 2, 12, 13, 14, 16
 rice, 1, 6, 10, 13, 16, 18, 19, 20
 farming systems, 16, 18, 19
 risk(s), 7, 8
 analysis, 7, 8, 10, 11
 assessment, 7, 8, 11
 communication, 11
 management, 7, 8, 9, 11
 Salatiga, 1, 6, 10, 13, 14, 16
 sanitation, 7, 8
 SDGs, 16
 soil, ecology, 16
 fertility, 16
 health, 6, 16, 18
 subak, 19
 sustainable agriculture, 16
 Timor Island, 2
 value, added, 13
 economic, 1, 3
 nutritional, 1, 2, 14
 vegetable(s), 3, 5, 15, 20, 21
 weeding, weeds, 10, 16, 19, 20
 West Kalimantan, 21
 wheat, 7, 8
 women, 13, 17
 Yogyakarta, 3, 20
 young farmer, 15
Biosecurity and biodiversity. Collected papers, Regional Master Class, February 2019, Salatiga