SMART FARMING ON DRYLAND MANAGEMENT TO SUPPORT FOOD SECURITY

Ministry of Agriculture
31 August 2020
RECENT AGRICULTURAL STATUS

• Agricultural GDP grew 16.24% (quarter II 2020) q to q 7 negative quarter II economic growth (-4.19%)

• GDP structure and growth according to business sector (y to y) in the second quarter of 2020 the national grew -5.32% and the agricultural sector recorded a positive 2.19%
PROGRAM FOR RICE PRODUCTION AS MAIN STAPLE FOOD

Production of 1970-2014 and Target of 2015-2017

Source: Sarlan, 2014; Central Bureau of Statistics 2015, MoA 2017

Target 2018: 82.1 million tons
Production 2018: 81.3 million tons

- Innovation technology
- PTT
- Increase Planting Index
- Expansion of Planting Area

Year

Source: Sarlan, 2014; Central Bureau of Statistics 2015, MoA 2017
Indonesian smart farming is supported by 19 Research Centers and 18 Research Institutes under Indonesian Ministry of Agriculture.
Indonesia is committed to reducing GHG emission by 26% in 2020 from the BAU level with its own efforts and reaching 41% reduction if it secures international support.

Presidential Regulation No. 61/2011 on National Action Plan GHG

Ministry of Agriculture Position:
- Contribute to the reduction of GHG emissions
- Adapting to climate change
National priorities in coping with Climate Change

- Adaptation the top-most priority
- Mitigation has been pledged by the government
- Synergizing of adaptation and mitigation actions
ACTION PROGRAM ADAPTATION FOR FOOD CROP AND HORTICULTURE

- Improvement of water management, irrigation system, rehabilitation of conditions of the upstream and downstream catchment area
- Development of water harvesting and water efficiency technology
- Development of tolerant environment varieties/adaptive varieties (temperature, drought, flood, inundation and salinity).
- Development of soil and crop management technologies to improve adaptability of crops: (a) land optimalization, (b) improvement of soil fertility

- Development of Weather Index Insurance
- Rural Agricultural Development Model Through Innovation (M-P3MI)
- Development “Model of the Sustainable Regional Food Area” (M-KRPL)
- Cultivation sleigh systems in the dry season, especially in the end of irrigation period.
- Cultivation of water-saving, by reducing high inundation in paddy field: intermittent irrigation
Low Emission Varieties:

*Rice*: Ciherang, Cisantana, Tukad Belian, Memberamo, IR 36, Dodokan.

Tolerant Salinity Varieties


Drought Stand Varieties

*Rice*: Dodokan, S-3382, BP-23, Imparari-10, Situ Bagendit, Situ Patenggang

Age Short Varieties

*Rice*: Dodokan, Silugonggo, Impari-1, Impari-12, Impari-13, S-3382, BP-23,

Immersion Resistant Varieties

Inpara-3, Impara-4, Impara-5, GH-TR-1, IR-69502-etc; IR7018-dst; IR70213-etc.

Soybean:

Argomulyo, Burangrang, GH-SHR/Wil-60, GH 983/W-D-5-211

Peanuts:

Singa, Jarapah

Green beans:

Kutilang, GH-157D-KP-1

Maize:

Bima, Lamuru, Sukmaraga, Anoman
Vulnerability analysis and the impact of climate change on agriculture.

Development of information networks, communication systems, climate advocacy, modules, maps and guides/tools (Cropping calendar, flood, drought).

Development of adaptive crop varieties more extreme climate change (drought, high temperature, salinity, flood).

Comprehensive study of the impact of peatland use.

Identification and mapping of climate change adaptation and mitigation.

Policy analysis for climate change adaptation and mitigation.

Increased food production capacity through expansion and development of new agricultural land.

Improved agricultural research and development capabilities.

Adoption system or transfer of technology at the farm level.
To meet food needs by 2050, Indonesia needs additional land of ± 14.9 million ha (rice fields, dry land and swamps).

The available DRY LAND covers an area of ± 10 million ha which is mostly in the form of degraded and abandoned land so it needs to be optimized.
Technology supporting for smart farming:

- Proxima soil sensing
- Digital soil test kit
- Inorganic fertilizer
- Organic fertilizer
- Nutrient management
- Soil conservation techniques
- Bio fertilizer
- Growing Technology
- Supporting for smart farming
Priority Product of Agricultural Land Resources of IAARD

- Soil Map Semi detail Scale 1:50,000 of 511 districts / cities throughout Indonesia

- Land Suitability map of 9 Strategic commodities of MoA (rice, maize, soybean, shallot, chili, sugarcane, cocoa, palm, feed) of 511 districts / cities throughout Indonesia

- Strategic Agricultural Commodity Direction Map of 511 districts / cities throughout Indonesia

- Strategic Agricultural Commodity Land Management Recommendation Package of 511 districts / cities throughout Indonesia
NEW SUPERIOR MAIZE TOLERANT ABIOTIC CONDITION AND HIGH PRODUCTIVITY

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drought tolerant</td>
<td>BIMA 20</td>
</tr>
<tr>
<td></td>
<td>JH 36</td>
</tr>
<tr>
<td></td>
<td>JH 27</td>
</tr>
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<td></td>
<td>JH 37</td>
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<td>JH 31</td>
</tr>
<tr>
<td></td>
<td>JH 45</td>
</tr>
<tr>
<td>Shadding tolerant</td>
<td>Jhana-1</td>
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<tr>
<td></td>
<td>JH 37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Productivity (t/ha)</th>
<th>New Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize for Feed</td>
<td>13,5</td>
<td>NASA 29, JH 29, JH 31 &amp; JH 37</td>
</tr>
<tr>
<td></td>
<td>21,5</td>
<td>JH 30, JH 32 &amp; JH 45</td>
</tr>
<tr>
<td></td>
<td>11,4</td>
<td>HJ 21, HJ 22</td>
</tr>
<tr>
<td></td>
<td>10,1</td>
<td>JH 28, JH 36</td>
</tr>
<tr>
<td></td>
<td>11,2</td>
<td>BIMA 1 - Bima 20 (semua hibrida)</td>
</tr>
<tr>
<td>Maize for Food</td>
<td>7,9</td>
<td>Srikandi Kuning,</td>
</tr>
<tr>
<td></td>
<td>6,0</td>
<td>Srikandi Putih</td>
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<tr>
<td></td>
<td>7,5</td>
<td>Srikandi Potil</td>
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<tr>
<td></td>
<td>6,0</td>
<td>Srikandi Putih</td>
</tr>
</tbody>
</table>
OTHER POTENTIAL CEREALIA PLANT

MAP OF DEVELOPMENT OTHER POTENTIAL CEREALIA

- **ACEH** (Aceh Tengah)
- **SUMUT** (Singkep, Pelalawan)
- **SUMBAR**
- **RIAU**
- **Jambi**
- **BENGKULU**
- **LAMPUNG** (Lampung Tengah)
- **DI YOGYAKARTA**
- **JATENG**
- **JABAR**
- **DKI JAKARTA**
- **KALTIM**
- **KALSEL**
- **GORONTALO**
- **SULUT**
- **SULBAR**
- **SULSEL**
- **SULTRA**
- **MALUKU**
- **MALUKU UTARA**
- **PAPUA BARAT**
- **PAPUA**

**Gandum** (Gowa, Sinjai, Luwu, Luwu Timur, Luwu Utara, Toraja Utara, Tana Toraja, Maros, Enrekang, Bone, Barito, Jemponto)

**Sorghum** (Sinjai, Luwu Timur, Toraja Utara, Tana Toraja, Maros, Enrekang, Bone, Pangkep, Barru, Wajo)

**Jewawut** (Mamasa, Mairin, Polewali Mandarin, Mamuju, Mamuju Utara)

**Sorghum** (Subang, Bandung)

**Gandum** (Kopaih, Rejang, Lebong)

**Jewawut** (Bengkulu Tengah, Seluma)

**Sorghum** (Demak, Wonogiri)

**Gandum** (Karanagan, Semaing, Banjarnegara)

**Sorghum** (Lamongan, Sambang, Lumajang)

**Gandum** (Pasuruan, Probolinggo, Malang)

**Sorghum** (Sumbu, Sambawa, Dompu)

**Sorghum** (Sumba Barat, Rotenggdo, Manggarai)

**Gandum** (Manggarai, Timor Tengah Selatan)
What is "Water Harvesting Infrastructure"?

About 30,000 small ponds had been developed based on Presidential Decree No. 1/2018.

.... to increase cropping intensity per year.

Small pond

Small dam

Long Storage

Shallow Well
FSV (Food Smart Village) : Water Use Efficiency - Local Food - Climate Change

CLOSED IRRIGATION (Drip Irrigation):
: super efficient water-use irrigation, clean water, suitable for hilly area, horticulture (but still expensive material)

INTEGRATED TECHNOLOGY ON WATER MANAGEMENT in VERY ARID DRYLAND
: intermittent, water distribution technique, conservation agriculture, mixed crops with limited soil water source :
Solar Irrigation is an environmentally friendly and high efficiency irrigation technology for horticulture.

**Specification:**
- Solar panel 100 – 400 WA
- Energy: Solar Pump (AC/ DC)
- Micro Irrigation System 0.5 – 1.0 ha
- Cost: 50 – 100 million IDR/unit
- Application: coastal land, dry land and swamp land

**Type-1**
(AC Pump, Bulk Irrigation)

**Type-2**
(AC Pump, Drip Irrigation)

**Type-3**
(Pump DC; drip)
DRONE FOR ENVIRONMENTAL FRIENDLY PESTICIDES

In menangkan organisasi pengangkutan tanaman (OPT) dan pengendalian ekstensi tanaman, penggunaan drone (penerbangan semut) dalam aplikasi penyemprotan pestisida pada areal pertanian sangat diperlukan.

Bali Pendidikan Lingkungan Pertanian (Biling) mengembangkan dan mengaplikasikan penyemprotan drone (penerbangan semut) dalam penanganan penyakit di areal pertanian. Optimasi pengaplikasian OPT dalam penanganan penyakit cairan pestisida nabati dapat mengurangi konsumsi pestisida.

Daftar penerbangan drone:
- Ekonomi dan efektivitas dalam penyemprotan (Kuw et al., 2016).
- Penelitian dan pengembangan pengaplikasian OPT dalam penanganan penyakit (Kuw et al., 2016).

Drone pestisida di Bali digunakan dengan penerbangan OPT.

Tabel pengaplikasian OPT cairan pestisida nabati dengan drone (OPT):

<table>
<thead>
<tr>
<th>Opt</th>
<th>TSP</th>
<th>Dosis</th>
<th>Pemotongan</th>
<th>Jarak Tempuh</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>

Panasonic Lingkungan Pertanian (Biling) mengembangkan dan mengaplikasikan penyemprotan drone (penerbangan semut) dalam penanganan penyakit di areal pertanian. Optimasi pengaplikasian OPT dalam penanganan penyakit cairan pestisida nabati dapat mengurangi konsumsi pestisida.

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Smart Screen House Development for Horticulture
RICE POSTHARVEST HANDLING (GAP, GHP, GMP, GSP)

ON-FARM
1. Work Efficiency

OFF-FARM
1. Quality Improvement
2. Reduction of Losses
3. Added Value

SELECTED, COMPREHENSIVE, AND PROGRESSIVE POSTHARVEST MECHANIZATION
Supported by Measurable Data Base

IMPROVEMENT OF INCOME AND WELFARE

PRECISION FARMING

TRENDS OF ECONOMIC CHANGE
INFORMATION SYSTEM FOR AGRICULTURAL IN ERA 4.0
Lands exposed to salinity sources are found along the coast:

- Low soil productivity (< 4 t/ha)
- SAR > 12
- Crop failure
- Spoiled soil

Remediation:
1. Leaching with fresh water nearby
2. Amelioration with gypsum
3. Planting with saline-resistant varieties
   - Rice: Way Apburu; Margasari; Lambur; GH-TS-1; GH-TS-2, Banyuasin, Indragiri
4. Providing good quality organic fertilizer
5. Use of fertilizers biological
Future Project on Dry Land Management for Agricultural Production

Objectives:
- Developing dryland farming models with export-oriented horticultural commodities integrated with livestock adopting advanced cultivation and post-harvest and value added technologies that could increase productivity, value-added products, and marketing supply chains,
- Develop modern agricultural irrigation infrastructure and conservation techniques on dry land to support the successful development of location-specific and commodity-specific dryland agriculture,
- Developing postharvest management and value added infrastructure and marketing of export-oriented horticultural products,
- Developing institutional capital, markets, cooperatives, and enhancing, the ability of farmers based on corporations, and ensuring the supply chain of horticultural commodity marketing.

The scope of project activities (5 Years duration):
- Preparation of the Grand Design model of modern dryland agriculture
- Development of modern agricultural irrigation infrastructure and conservation techniques
- Development of postharvest management and value added infrastructure and marketing of export-oriented horticultural products
- Strengthening of horticultural farmer institutions through corporation model based on information technology, and optimizing horticultural commodity supply chain marketing.
Terima Kasih
Thankyou