RESULTS OF RESEARCH DESIGN, MANUFACTURE AND TESTING OF MAIZE SEEDING-MACHINE FOLLOWING MINIMUM TILLAGE METHOD IN CLIMATE CHANGE REGIONS

Presentation by

Name: Tran Duc Tuan
Title: Researcher

Ductuanvcd@yahoo.com, Ductuanvcd@gmail.com
Agency: Vietnam Institute of Agricultural Engineering & Post harvest Technology (VIAEP)
1. Introduction

<table>
<thead>
<tr>
<th>Land Area</th>
<th>330,951sqkm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital City</td>
<td>Hanoi</td>
</tr>
<tr>
<td>Population</td>
<td>87,262,356</td>
</tr>
<tr>
<td>Language</td>
<td>Vietnamese (official),</td>
</tr>
<tr>
<td>Religion</td>
<td>Buddhism, and Catholic.</td>
</tr>
<tr>
<td>Climate</td>
<td>North Vietnam has Southern Mediterranean type climate. South Vietnam has a tropical monsoon climate.</td>
</tr>
<tr>
<td>Local Time</td>
<td>GMT +7</td>
</tr>
<tr>
<td>Currency</td>
<td>Vietnamese Dong (VND)</td>
</tr>
<tr>
<td><strong>Agriculture produces:</strong></td>
<td><strong>Rice, maize, coffee, tea, cashewnut, rubber, fishesies, shrimp, ..</strong></td>
</tr>
</tbody>
</table>
1. Introduction

- Agricultural production land: 10,151,100 ha
- Forestry land: 15,373,100 ha
- Specially used land: 1,846,800 ha
- Homestead land: 690,900 ha
- Unused land: 3,074,000 ha

(Statistical Yearbook of Vietnam, 2012)
1. Introduction

Climate (World Atlas)
Vietnam locates between 8° 30' to 23° 22' latitudes in the north tropic latitudes; therefore it belongs to the tropical area. **Climate in Vietnam is mostly warm all the year recently.**
The southern is full with sunshine; the northern part is also covered with even sunny months.
Average air temperature is 22° - 28°C but this air temperature in a year is quite different between the north and south region. **The southern is characterized by two seasons, a wet season from May to October and a dry season for the rest of the year.**
The northern has four seasons summer, autumn, winter and spring separately. Average air humidity reaches to 70% - 80%, and average of rainfall is about 1500-2000 mm some high mountainous areas could the over 2500-3000 mm a year as. Annual rainfall, frequently causing floods.
1. Introduction

Climate in Vietnam is mostly warm all the year recently.

Source: http://www2.hcmuaf.edu.vn/contents.php?ids=5992&ur=pvhiyen&lng=vn
Climate in Vietnam is mostly warm all the year recently.

Analysis of climate change in Vietnam - Precipitation

Vietnam Annual Precipitation, 1901-1998
2. CLIMATE CHANGE

Whole 2015, natural disasters:
Killed 154 people dead, 127 injured,
1,242 houses collapsed, gone;
35,233 houses were flooded, damaged, roofs;
445 110 hectares of rice and crop damage;
millions m³ of rock transportation,
irrigation landslides and sedimentation ...
Estimated total damage by natural disasters around 8114 billion VND, which mainly focus on agricultural crop damage, erosion of roads, irrigation, power supply systems, telecommunications, mining, ...
1. Introduction

Northern
Up to May 2016
The agricultural sector heavily damaged: estimated loose 400 billion VND
* with 52,000 cattle died,
* 150,000 ha of rice died,


2. CLIMATE CHANGE
2. CLIMATE CHANGE

* May/2016 to 22/63 provinces have been affected by drought and invasive mangrove
especially 9 provinces in the Mekong Delta
* 288 259 households lack water for life;
Losses: of up to 249 944 ha of rice; 18 960 hectares of crops, fruit trees, 30 522 ha,
2. CLIMATE CHANGE

2016

* Vietnam loosen more than 15,000 billion VND because of the drought, invasive mangrove history

Lost: more than 800,000 tan rice

1. Introduction

* Why?
• Clime change?

-------- Required done some thing to reduce impact of nature disaster.

There are many reasons for climate change

We are done agricultural,
3. Solutions for Agriculture

Vietnamese Government has policies

* Decision
APPROVAL SCHEME AGRICULTURAL SECTOR
RESTRUCTURING PLANS FOR ENHANCING BY VALUE
ADDED AND SUSTAINABLE DEVELOPMENT
Number 899/QĐ-TTG
*signed* June 10, 2013 By the Prime Minister - the Socialist Republic of Viet Nam
3. Solutions

High Mountain

Sustainable product

High slope >40%

Plateau

Slope < 40%

Flat land < 25%

3. Solutions
3. Solutions

- Minimum mechanical soil
- Permanent organic soil cover.
- Diversification of crop species grown in sequences and/or associations.

http://www.fao.org/ag/ca/1a.html

2. Conservation Agriculture (CA)

1. Minimum mechanical soil disturbance
2. Permanent organic soil cover
3. Diversified crop rotations including cover crops

Reminder – A healthy soil is a living biological system
3. Solutions

Conservation Agriculture

Farmer Field School participants harvesting no-till IPM potatoes in lowland rice production systems, Thai Binh, Vietnam, 2011
3. Solutions

The whole Mekong Delta region has 112 thousand hectares conversion spring-summer rice production to other crops such as corn, dragon, black sesame, chili, pineapple ..., partly to meet demand market, increased economic efficiency compared to rice and the reduce effects of lack water

3. Solutions

Maize area Increased

<table>
<thead>
<tr>
<th></th>
<th>Đơn vị</th>
<th>2015 (ước tính)</th>
<th>2016 (ước tính)</th>
<th>2017 (dự báo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>nghìn ha</td>
<td>1.179</td>
<td>1.300</td>
<td>1.300</td>
</tr>
<tr>
<td>capacity</td>
<td>tấn/ha</td>
<td>4,48</td>
<td>4,6</td>
<td>4,8</td>
</tr>
<tr>
<td>yield</td>
<td>nghìn tấn</td>
<td>5.281</td>
<td>5.980</td>
<td>6.240</td>
</tr>
</tbody>
</table>

Total maize import Reduce

<table>
<thead>
<tr>
<th>Time</th>
<th>From May 2013 to May 2014</th>
<th>From May 2014 to February 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>253.268</td>
<td>USA</td>
</tr>
<tr>
<td><strong>Quốc gia khác</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>771.630</td>
<td>Ấn Độ</td>
</tr>
<tr>
<td>Brazil</td>
<td>927.679</td>
<td>Brazil</td>
</tr>
<tr>
<td>Thái Lan</td>
<td>198.491</td>
<td>Thái Lan</td>
</tr>
<tr>
<td>Các hội nhập-na</td>
<td>141.290</td>
<td>Các hội nhập-na</td>
</tr>
<tr>
<td>Lào</td>
<td>25.903</td>
<td>Lào</td>
</tr>
<tr>
<td>Cambodia</td>
<td>62.850</td>
<td>Căm-pu-chia</td>
</tr>
<tr>
<td><strong>Other countries</strong></td>
<td>2.381.111</td>
<td>1.584.179</td>
</tr>
<tr>
<td>Các quốc gia khác ngoài các nước trên</td>
<td>17.515</td>
<td>28.000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2.398.626</td>
<td>1.875.218</td>
</tr>
</tbody>
</table>

Source: Ministry of Agriculture and Rural Development

3. Solutions

Conservation agriculture

The 4th Regional Forum on Sustainable Agricultural Mechanization in Asia and the Pacific
3. Solutions

Conservation agriculture machines
4. Research, design and manufacture

Not detail

Minimum mechanical soil, reduce time tractor done

Figure 1 - Maize seeder machine

Technical requirements
Corn sowing models under the minimum tillage work machine
- Capacity: $0.2 \div 0.3$ ha/h.
- Soil is made small in a position sowing seed (80% soil reached $3 \div 5$ cm of thickness)
- Number of rows planted: 3 rows
- Distance row sowing (cm) $60 \div 80$
- Distance between 2 planter: $25 \div 30$ cm
- Tractor link $30 \div 35$ HP
5. Testing maize seed machine

- Methodology
  - Laboratory lay-out methods (field preparation)
  - Testing and evaluation of maize seed machine was done according to the RNAM, (1985) standards; TCVN 2005
- Data processing and analysis
  The data were summarized, tabulated and analyzed with help of Microsoft Excel and SPSS.

- Instruments and equipment used for testing machine

Test conditions.
5. Testing maize seed machine

- Methodology
- Instruments and equipment

- **Test conditions.**
  - Experiment on the field in Gia Lam district,
  - 3 pots, each pot have **sizes is 30 m x 60 m (1800m²)**

Data were taken at random, but need far from edge of field more than 10 meter,
## 5. Testing maize seed machine

### 5.3. RESULTS AND DISCUSSION

<table>
<thead>
<tr>
<th>STT</th>
<th>Structure of machine</th>
<th>Đơn vị</th>
<th>Giá trị thông số</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overall dimensions (LxWxH)</td>
<td>mm</td>
<td>1850×1880×970</td>
</tr>
<tr>
<td>2</td>
<td>Width of work</td>
<td>mm</td>
<td>1600</td>
</tr>
<tr>
<td>3</td>
<td>Total blades rotary</td>
<td>Chiếc</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>Type blades</td>
<td>Lưỡi cong</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Number of group blade</td>
<td>cúm</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Number of blades each group</td>
<td>lưỡi</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Width work of blades cluster</td>
<td>mm</td>
<td>200 ÷ 210</td>
</tr>
<tr>
<td>8</td>
<td>Top blade diameter of rotary</td>
<td>mm</td>
<td>480</td>
</tr>
<tr>
<td>9</td>
<td>Structural adjustment of rotary depth</td>
<td>-</td>
<td>quay ren vít</td>
</tr>
<tr>
<td>10</td>
<td>Transmission structure for rotary</td>
<td>-</td>
<td>Bánh răng, xích</td>
</tr>
<tr>
<td>11</td>
<td>Type of sowing division</td>
<td>mm</td>
<td>kiểu đĩa nghiên</td>
</tr>
<tr>
<td></td>
<td>Diameter of disc sowing</td>
<td>lỗ</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Number of holes in the seeding disc</td>
<td>mm</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Fire particle diameter</td>
<td>mm</td>
<td>10, 11, 12</td>
</tr>
<tr>
<td></td>
<td>The thickness of the disc</td>
<td>Độ</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>The tilt angle of the disk sowing</td>
<td>cúm</td>
<td>25 ÷ 45</td>
</tr>
<tr>
<td></td>
<td>Number of Sower clusters</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>
5. Testing maize seed machine

### 5.3. RESULTS AND DISCUSSION

| 12 | Wheel transmission  
*Dimention of wheel*  
Wheel width  
Height lugs cling  
Transmission chain  
\( Z_1 = 28, \ Z_2 = 14 \)  
Bevel gear pair: \( m = 3, \ Z_1 = 16, \ Z_2 = 16, \)  
Length of teeth \( b = 30 \text{ mm} \) | mm | 330  
mm | 100  
mm | 30  
t | 12.7 |
|---|---|---|
| 13 | Slitting groove parts  
*Land separating angle*  
Slitting blade height | Độ mm | Kiểu dao rạch  
15÷0 150 |
| 14 | Pipe nuts  
*Type, type*  
*Diameter pipe* | - mm | Nhựa mền, trong 21 |
| 15 | Soil compression unit  
*Diameter D*  
*Width B* | mm mm | 200 100 |
| 16 | The volume of container seed kg | 10 |
| 17 | Style link with tractor - | Kiểu treo |
| 18 | Capacity tractor | Hp | 25÷35 |
6. Conclusions of testing
6. Conclusions of testing
6. Conclusions of testing

Prototype maize seeding-machine follow minimum tillage method (GNTT-0.25) will be well condition support for developing Conservation Agriculture in Vietnam. Best difference of GNTT-0.25 machine when compare with another seed drills machine is GNTT-0.25 machine don't need soil tillage before sowing the seed. GNTT-0.25 machine will be done limit tillage and direct sowing seed together in one time operation; GNTT-0.25 machine attach with tractor by three point linkage, capacity of tractor is 25÷35 Hp. Specifications of GNTT-0.25 machine: Capacity: 0.25 ha/h; Number of row: 3 rows; Distance between 2 rows: 65 cm; Distance between 2 planter: 25÷30 cm, Missing seed: < 3%; Non injure seed
Thank you.

Presentation by
Name: Tran Duc Tuan
Email: Ductuanvcd@yahoo.com, Ductuanvcd@gmail.com
Agency: Vietnam Institute of Agricultural Engineering & Post harvest Technology (VIAEP)