

# Medium-Scale Corn Technologies

Presented by: OACaparino  
BPRE

## BRIEF INTRODUCTION

- ☺ Bigger machinery are not suitable to local condition  
*More than 50% of farms sizes are less than 2 ha ,  
(Hill, H. 1986 and Halos, S. 2005)*
- ☺ Imported corn machinery are too expensive



4- row planter (pneumatic) = P 0.8 -1.2 M  
2-row planter (pneumatic) = P 0.6 M

Boom Sprayer =  
P 350T

Combine Harvester =  
P 6.8- P7.0 M

- ☺ Imported mechanical planter is relatively cheaper

- ☺ *But Mechanical metering system is not suited to local hybrid seeds as they are not uniform in size resulting to inconsistent seed drops*



- ☺ Dela Cruz, SM (2003) recommended that instead of changing farm sizes, from several small farm areas to one big consolidated farm so that big machines could be used, an alternative strategy of mechanizing small farm holdings is the introduction of smaller machines that would be more appropriate for the present farm sizes.


## OBJECTIVE

To develop corn machineries that are technically and financially viable under medium-scale of operation.

## RESEARCH OUTPUT

## BPRE Pneumatic Corn Planter

*Features*



- Pneumatic seed metering
- Equipped with a planting assembly and fertilizer assembly.
- Adjustable metering device for fertilizer
- Adjustments for row spacing, hill spacing, grain depth and soil cover pressure.
- It has an optional furrower
- Seed metering and fertilizer applicator has separate ground wheel and gear box
- inclusion of agitator in the fertilizer metering system
- Detachable hitching system



## Field Performance Testing of BPRE Pneumatic Corn Planter

Description of Testing Sites

CONDITION / CHARACTERISTICS	ALCALA	BINALONAN
Soil Type	Sandy Loam	Clay loam
Length of Field	96	103
Land Preparation	DP(Disc Harrow) SP(Peg Tooth Harrow)	DP(Rotavator) DP(Peg Tooth Harrow)
Tractor Power	22 Hp	26 Hp
Date of Planting	November 2005	November 2005
Seed Variety	Hybrid Corn	Hybrid Corn
Irrigation	Furrow irrigation*	Furrow irrigation


\* DP - Double Passing  
 \* 5 days heavy rains occurred one (1) day after planting

## Field Performance Testing of BPRE Pneumatic Corn Planter

Summary of mean data of computed technical parameters

PARAMETERS	ALCALA (sandy loam)			BINALONAN (clay loam)		
	3.0 kph	3.5 kph	4.0 kph	3.0 kph	3.5 kph	4.0 kph
Area Planted, m2	807	680	1,050	810	862	966
Tractor Speed, km/ hr	3.0	3.5	4.0	3.0	3.5	4.0
Theoretical (GPS)	2.9	3.3	4.0	3.0	3.2	3.8
Theoretical Planting Cap. ha/ day	3.3	3.7	4.5	3.3	3.6	4.2
<b>Actual Planting Cap., ha/ day</b>	<b>2.4</b>	<b>2.3</b>	<b>3.3</b>	<b>2.3</b>	<b>2.5</b>	<b>3.3</b>
Field Efficiency, %	73.95	62.40	74.86	67.35	70.39	77.06
A. Seed Density, # of seeds/ha	47,048	51,048	51,333	50,857	52,952	54,476
<b>Hill Planting Efficiency, %</b>	<b>80.20</b>	<b>86.72</b>	<b>86.38</b>	<b>88.39</b>	<b>89.22</b>	<b>93.73</b>
Hill Spacing, cm	33	30	30	30	29	28
Percent Missed Hill, %	19.80	13.28	13.62	11.61	10.78	6.27
Fertilizer App. Rate, bags/ ha		5.5			5.7	

## BPRE Boom Sprayer



*Features*

- ☺ Trailing type
- ☺ 1,000 liter tank capacity
- ☺ 6 meter swath
- ☺ Motor pump powered via the PTO of the tractor

Trailing type

## BPRE Boom Sprayer



Hitch type

### Features

- Hitch type
- 300 liter tank capacity
- 4 meter swat
- Motor pump powered via the PTO of the tractor
- Fan type nozzle

## Field Performance Testing of BPRE Hitch-type Boom Sprayer

Summary of mean data of computed technical parameters

Technical Parameters	Binalonan, Pangasinan
Dimension, L x W (m)	150 x 12
Area (m <sup>2</sup> )	1,800
<b>Average Travel Speed (km/ hr)</b>	<b>2.50</b>
Gear Setting	Low – 2st gear
PTO Setting	2nd gear
Tractor PTO Speed (rpm)	500
Volume Applied (Liter)	51.5
Average Flow Rate of Nozzle (ml/ sec)	10.7
<b>Spraying Capacity (ha/ day)</b>	<b>6.40</b>
<b>Spraying Efficiency (%)</b>	<b>95.4</b>

## BPRE Corn Picker



### Features

- Tractor-mounted
- Picking roller is made of a spiral lugged type
- PTO driven
- Equipped with stalk ejector, adjustable picking height, adjustable picking roller and ear corn

## BPRE Corn Picker



### Features

- Tractor-mounted
- Picking roller is made of a spiral lugged type
- PTO driven
- Equipped with stalk ejector, adjustable picking height, adjustable picking roller and ear corn
- With support wheel
- Adaptable to any medium size tractors.

## Field Performance Testing of BPRE Corn Picker



## Field Performance Testing of BPRE Corn Picker



### Field Performance Testing of BPRE Corn Picker

#### Description of Testing Sites

CONDITION / CHARACTERISTICS	ALCALA (Detasseled)	BINALONAN (Not – Detassel)
Corn Stalks	Dried Mostly straight	Dried Mostly straight
Soil Type	Sandy Loam	Clay loam
Length of Field	57.2	139.5
Date before harvest	121 days	129 days
Headland	None	4 meters
Date of harvesting	February 28, 2006	March 8, 2006
Seed Variety	Hybrid Corn	Hybrid Corn

### Field Performance Testing of BPRE Corn Picker

#### Summary of mean data of computed technical parameters

PARAMETERS	ALCALA (De-tasseled)			BINALONAN (Non De-tasseled)		
	1.9 kph	2.9 kph	3.5 kph	1.9 kph	2.9 kph	3.5 kph
Area Harvested., m <sup>2</sup>	250	250	250	586	586	586
<b>Tractor Speed , km/ hr</b>	<b>1.92</b>	<b>2.63</b>	<b>3.11</b>	<b>1.83</b>	<b>2.20</b>	<b>2.85</b>
Theo. Picking Cap. ha/ day	1.12	1.53	1.81	1.02	1.05	1.59
<b>Effective Picking Cap , ha/ day</b>	<b>0.70</b>	<b>0.78</b>	<b>0.89</b>	<b>0.86</b>	<b>1.00</b>	<b>1.18</b>
Field Efficiency, %	62.19	50.97	49.26	83.92	82.01	73.70
<b>Picking Efficiency, %</b>	<b>98.35</b>	<b>98.63</b>	<b>98.76</b>	<b>96.13</b>	<b>95.55</b>	<b>93.88</b>
De-husked Picked Corn Ear, %	19.21	19.28	15.98	11.17	13.58	7.00
Damaged Picked Corn Ear, %	4.89	4.13	3.42	2.80	4.60	1.20
Picking kernel Loss, %	0.16	0.19	0.08	0.10	0.13	0.05
Fuel Consumption (l/ ha)	19.04			15.56		

### Financial Analysis

PARAMETERS	CORN PLANTER	BOOM SPRAYER	CORN PICKER
Annual Utilization (# of days)	70	70	70
Rental Fee (P/ ha)	1,850.00	1,000.00	2,400.00
Capacity (ha/ day)	3.3	6.4	1.18
Investment Cost	585,349.00	385,896.00	564,997.00
Fixed Cost	124,905.84	82,993.36	121,649.52
Variable Cost	212,095.59	215,380.58	89,983.86
Total Operating Expenses	337,001.43	298,373.94	≥211,633.38
Annual Gross Income	487,350.00	448,000.00	≥258,240.00
Annual Net Income	150,348.57	149,626.06	≥46,606.62
Payback Period (Year)	3.55	2.45	≥9.78
Benefit Cost Ratio	1.39	1.98	< 1
Internal Rate of Return (%)	28.73	40.89	< 1

