YIELD GROWTH RATES AND CROPPING SYSTEM UPTAKE
BRAZILIAN DOUBLECROPPING: SUMMER CORN AREA VS WINTER CORN AREA 1979-2017

Planted Area (1,000 ha)

- summer corn area
- winter corn area
CREATING OPTION VALUE
CORN YIELD EQUIVALENT AS FUNCTION OF TOTAL PRODUCTION COST PER ACRE

- Production Cost Before Land ($)
- Units (Bu)

Graph showing corn yield equivalent as a function of total production cost per acre for Iowa and Mississippi.
OPERATING INCOME AS FUNCTION OF PRODUCTION COSTS

<table>
<thead>
<tr>
<th>Units (Bu)</th>
<th>Income ($) @ $4/bu price</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Basis Adjustment</td>
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<tr>
<td></td>
<td>$4.00</td>
</tr>
<tr>
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IOWA

MISSISSIPPI

Production Cost Before Land ($)
IOWA YIELD AND INCOME VS PRODUCTION COST DYNAMICS

Production Cost Before Land ($)

Income (Bu)

$6.50
$6.00
$5.50
$5.00
$4.50
$4.00
$3.50
$3.00
$2.50
MISSISSIPPI YIELD AND INCOME VS PRODUCTION COST DYNAMICS
OPERATING MARGIN BEFORE LAND COSTS
IOWA FARMLAND AS A STACK OF CORN CALL OPTIONS

Income ($)

Units (bu)

Production Cost Before Land ($)

$2.00 $2.50 $3.00 $3.50 $4.00

15 %
IOWA FARMLAND AS A STACK OF CORN CALL OPTIONS

Incremental units (Bu)

Income ($) vs. Units (Bu)

Production Cost Before Land ($) vs. Incremental units (Bu)

- $2.00
- $2.50
- $3.00
- $3.50
- $4.00

15 %
IOWA FARMLAND AS A STACK OF CORN CALL OPTIONS

<table>
<thead>
<tr>
<th>Income ($)</th>
<th>Bushels</th>
</tr>
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<tbody>
<tr>
<td>$2.00</td>
<td>$2.50</td>
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<tr>
<td>$3.00</td>
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Production Cost Before Land ($)

Units (Bu)

Income ($)
MISSISSIPPI FARMLAND AS A STACK OF CORN CALL OPTIONS
Reference Options: December 2020 CME Corn. Width of Bar = Current Value of Reference Option

Production Cost Before Land ($)

Incremental units (Bu)

Units (Bu)

Income ($)

- $3.00
- $3.50
- $4.00
- $4.50
MISSISSIPPI FARMLAND AS A STACK OF CORN CALL OPTIONS

Farmland Price Adjustment: Double the Option Stack

Production Cost Before Land ($)
TIME VALUE OF CORN OPTIONS

December 2020 and 2021 Corn Call Options as a Percentage of December 2019 Options by Strike Price
SUSTAINABLE WEED MANAGEMENT
WEED SEED SPREAD
BREAKING THE WEED RESISTANCE CYCLE

Drift of spray into non-cropland border areas is well known as drift measurements under normal conditions vary from 1-15% of target application at 1m from the last spray nozzle. While shown to be highly predictable, drift is also highly variable because of dependence on droplet size in addition to wind speed and release height. While a 1000 micron droplet drifting 4.7 feet in a 3mph wind from a release height of 10 feet, a 5 micron droplet will travel 3 miles under the same conditions.
UNDERSTANDING THE POTENTIAL FOR RESISTANCE EVOLUTION TO THE NEW HERBICIDE PYROXASULFONE

FIELD SELECTION AT HIGH DOSES VERSUS RECURRENT SELECTION AT LOW DOSES
Field screening indicated that no major-effect resistance genes were present in 100 million individuals. Resistance was obtained by recurrent low-dose pyroxasulfone selection of multiple herbicide-resistant *L. rigidum*. The multiple-resistant MR population showed a clear capacity to evolve pyroxasulfone resistance with >30% plant survival at 240 g ha⁻¹ (2.4-fold the recommended rate after three generations of recurrent selection.)
DICAMBA RESISTANT PIGWEED TRIAL
GREENHOUSE EXPERIMENT

Through experimentation in the greenhouse, we selected a population of pigweed that is tolerant to herbicide dicamba at a field rate. This pigweed population was not found to be resistant to dicamba in nature or in any field.

SCOTT

Researchers exposed three generations of dicamba-susceptible pigweed collected from the field to sublethal doses of dicamba (conditions for resistance development)
DISTANCES INCREASING BY ORDER OF MAGNITUDE

US CORN & SOY BORDERS

MOON APOGEE

EARTH CIRCUMFERENCE

US COAST-TO-COAST

<table>
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<th>1,000,000</th>
<th>1,500,000</th>
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