



The 5th Global Science Conference on  
**CLIMATE-SMART  
AGRICULTURE 2019**

8-10 October 2019 | Bali, Indonesia

# BUNDLES OF JOY?

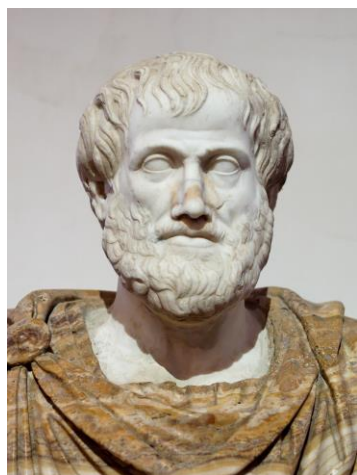
USING THE ERA DATABASE TO EXPLORE THE  
OUTCOMES OF CSA PRACTICE INTERACTIONS

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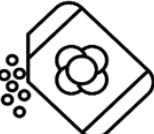
# A TYPOLOGY OF PRACTICE INTERACTIONS



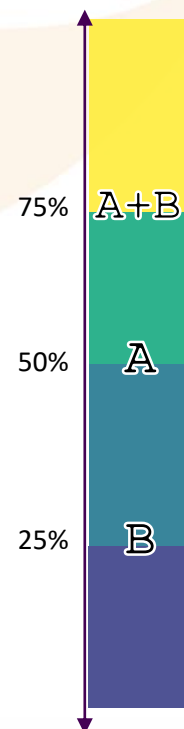
“The whole is greater than the sum of parts.”

**A**  Inorganic fertilizer increases yield **50%**

**B**  Improved varieties increase yield **25%**

**A**  **B**  **= ?**

% Change in Yield



## Superadditive or Synergy

$$A*B > A+B$$

Bundle is better than the sum of doing both practices alone.

## Additive

$$A+B > A*B > \max(A|B)$$

Bundle is better than either practice alone.

## Averaging

$$\max(A|B) > A*B > \min(A|B)$$

Bundle is worse than the best practice alone, better than the worst practice alone.

## Antagonistic

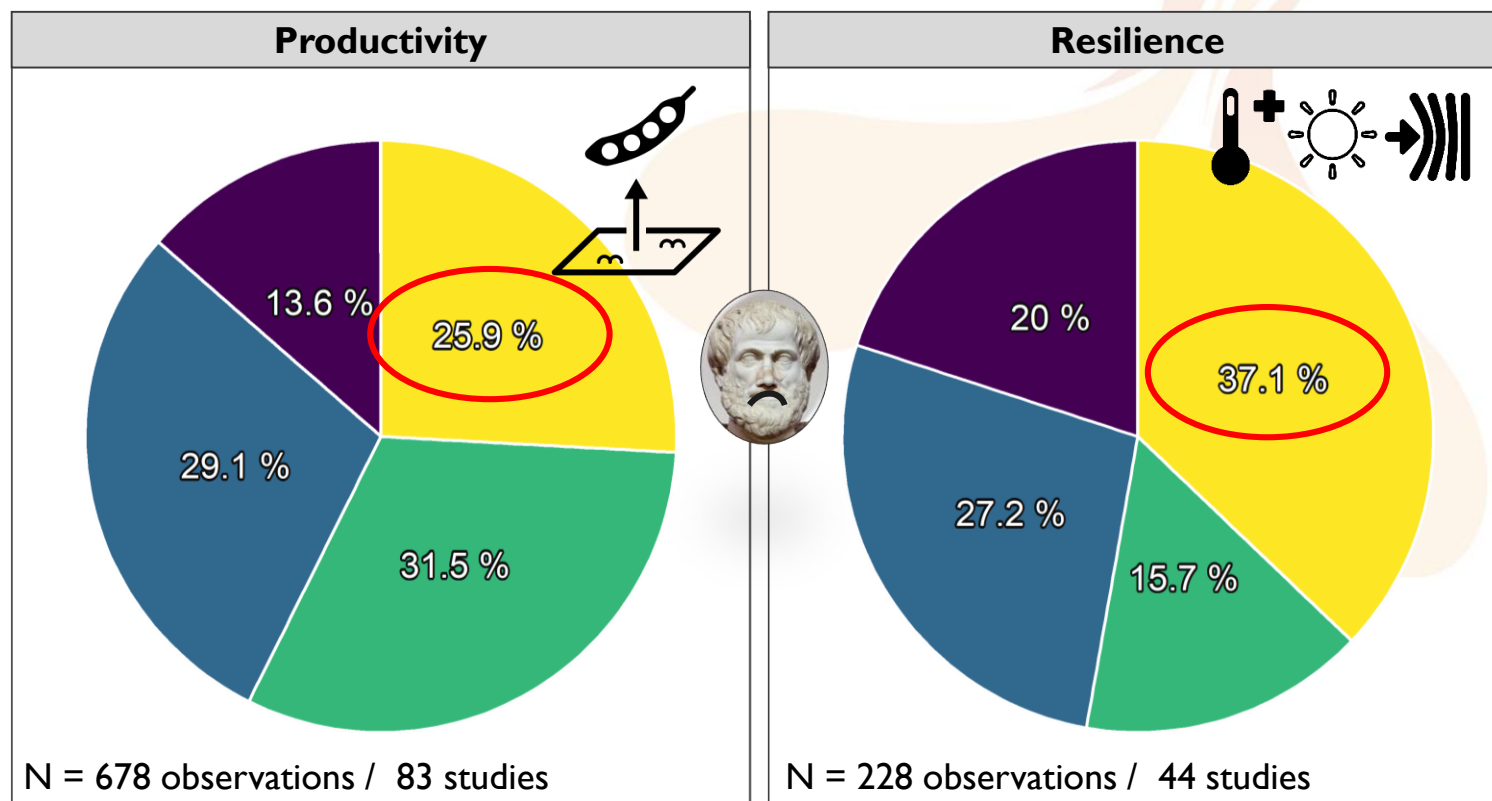
$$A*B < \min(A|B)$$

Bundle is worse than either practice alone.

# BUNDLES & CSA PILLARS



Weighted % of observations by interaction type per CSA outcome

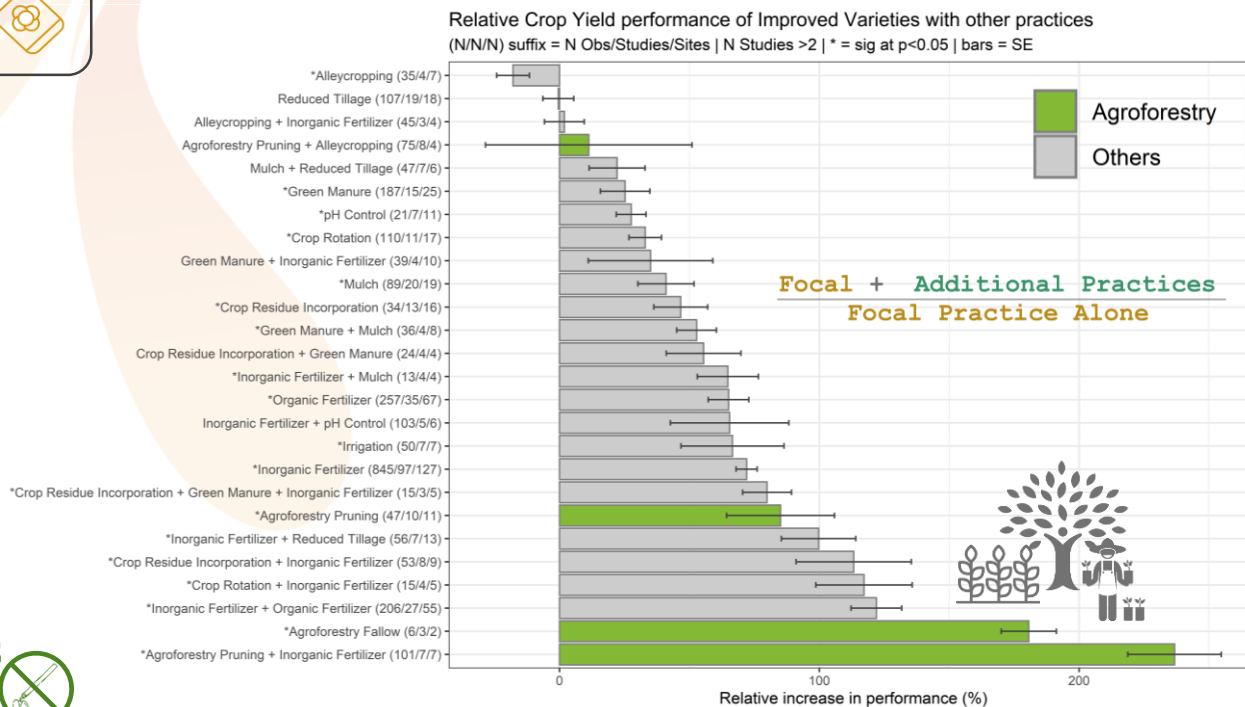


Interaction.Type  Antagonistic  Averaging  Subadditive  Superadditive

# THERE'S MORE THAN ONE WAY TO TEST A BUNDLE



Focal Practice = A



Focal = Improved varieties



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