# **Specialty**: Plant Pathologist

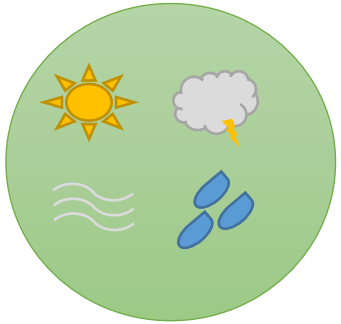
- Expert in bacterial diseases of rice plants
- Focuses on the bacterial pathogen: *Xanthomonas oryzae* pv. *oryzae* (*Xoo*)
- *Xoo* causes bacterial blight of rice
- Understands what factors are important for the disease to start

# **Specialty**: Agronomist

- Expert in soil management and crop production
- Focuses specifically on the production of rice
- Understands what components rice plants need for proper growth and production

# **Specialty**: Climatologist

- Expert on effects of changes in temperature and why it could be rising
- Focuses on tropical storm occurrences
- Understands what factors are important for severe changes in the weather patterns

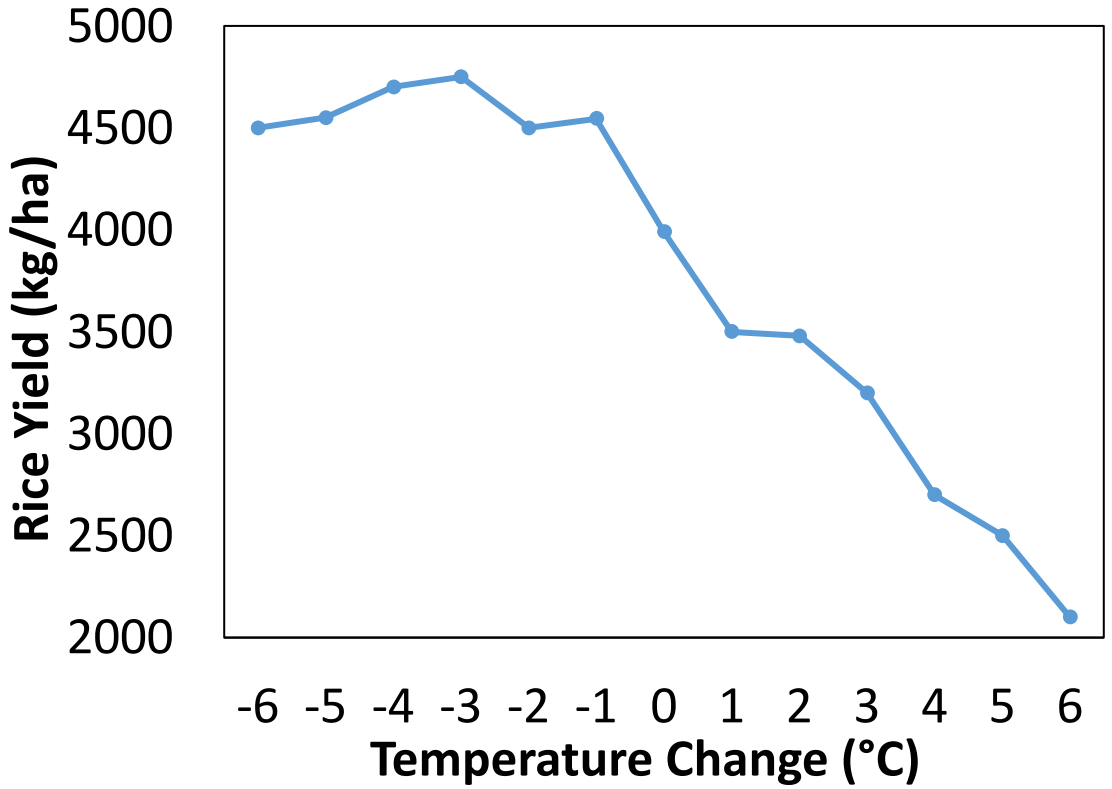


# **Specialty**: Economist

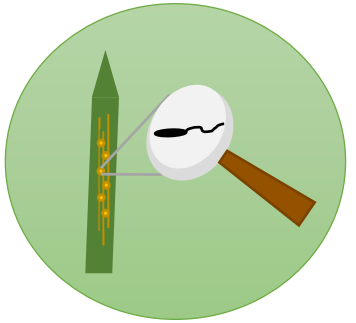
- Expert on the monetary value of rice production
- Middleman in financial situations for rice acquisition from farmers to interested buyers
- Understands what factors are important for changes in crop demand

# Food Security Specialist

Expert in organizing and implementing a food security program through policies and procedures with local and international government agencies

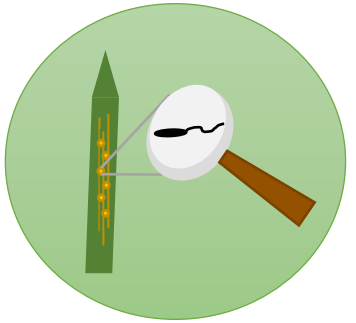


# Plant Pathologist



- Bacterial blight (BB) is **favored by warm temperatures**, high humidity, rain, and deep water
- The bacterium can be **easily disseminated** by irrigation water, by splashing or windblown rain, by plant-to-plant contact
- Can cause **yield losses up to 70%**, if undetected can cause total loss
- *Xoo* ranked in the top-10 list of bacterial plant pathogens
- *Xoo* is widely distributed throughout rice growing countries in Asia & Africa
- In Asia, perennial weeds are considered **alternate hosts** that *Xoo* can live in during winter months

# Plant Pathologist Data Points



| Year | Disease Prevalence* (%) |
|---|---|
| 1994 | 25 |
| 1996 | 30 |
| 1998 | 45 |
| 2000 | 35 |
| 2002 | 55 |
| 2004 | 70 |
| 2006 | 65 |
| 2008 | 75 |
| 2010 | 80 |
| 2012 | 95 |
| 2014 | 85 |
| 2016 | 90 |
| 2018 | 95 |

*= Reported and Confirmed Bacterial Blight

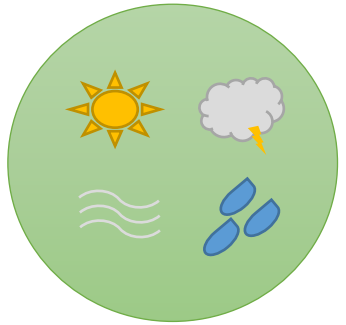
# Agronomist

- Optimal conditions for rice growth
  - Temperature (day & night): **29/21°C**
  - Moisture: **High**
  - Soil requirements: **Grows on a variety of soils**
    - If nutrient content is too high can lead to plants being more susceptible to pests
- If grown outside of optimal conditions rice plants **do not** grow at the normal rate of a healthy rice plant (**will not reach high yields such as 5000 kg/ha**)
- More specifically, high nighttime temperature has been shown to **negatively impact growth**

# Agronomist Data Points:

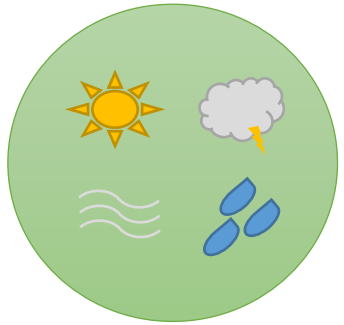
| Year | Yield (kg/ha) |
|---|---|
| 1994 | 4800 |
| 1996 | 4850 |
| 1998 | 4700 |
| 2000 | 4750 |
| 2002 | 4600 |
| 2004 | 4545 |
| 2006 | 3990 |
| 2008 | 3500 |
| 2010 | 3480 |
| 2012 | 3200 |
| 2014 | 2700 |
| 2016 | 2500 |
| 2018 | 2000 |

# Climatologist



- Air temperatures have been slowly increasing over the years
- Tropical **storm incidences** have been increasing steadily, storm duration is hard to identify
- As tropical storms approach, the severity of **wind and precipitation** becomes more unpredictable
- 2017 marks the **highest annual temperature** and the 41$^{st}$ consecutive year that global temperatures have risen
- By 2050, global temperatures are expected to **increase approx. 3°C**
- **Night temperatures are increasing**, leading to plants being exposed longer to high temperature conditions
- As temperatures increase, humidity becomes more **unpredictable**

# Climatologist Data Points



| Year | Tropical Storm Probability (1- low, 6-high) |
|---|---|
| 1994 | 1 |
| 1996 | 2 |
| 1998 | 1 |
| 2000 | 3 |
| 2002 | 4 |
| 2004 | 4 |
| 2006 | 5 |
| 2008 | 4 |
| 2010 | 5 |
| 2012 | 5 |
| 2014 | 6 |
| 2016 | 4 |
| 2018 | 5 |

# Agricultural Economist

- Over the years rice yield has declined substantially, up to **40% crop loss seen on average** with some years worse than others
- As yield decreases, demand increases leading to prices increasing
- Due to increase in production price and demand the **average cost for consumer has increased**
- The average price for rice is **~20 pesos/kg**, however these prices have been steadily increasing

# Agricultural Economist Data Points

| Year | Rice Prices (pesos/kg) |
|---|---|
| 1994 | 5 |
| 1996 | 5 |
| 1998 | 6 |
| 2000 | 8 |
| 2002 | 8 |
| 2004 | 10 |
| 2006 | 15 |
| 2008 | 20 |
| 2010 | 35 |
| 2012 | 38 |
| 2014 | 35 |
| 2016 | 37 |
| 2018 | 40 |