# Methods

To estimate the relative risk of three major rice diseases in India, the EPIRICE model (Savary et al. 2012; Hijmans et al. 2015) was used with interpolated Global Summary of the Day (GSOD) data at 15 arc-minutes (Sparks unpublished) for the years of 2001 to 2008. The statistical software, R (R Core Team 2015) package raster (Hijmans 2015) was used to extract the resulting area under the disease progress curves for bacterial blight, caused by *Xanthomonas oryzae* pv. *oryzae*; brown spot, caused by *Cochliobolus miyabeanus*; and leaf blast, caused by *Magnaporthe oryzae* by state and were classified according to relative risk. Results were compared with district level maps that had been vetted by expert Indian scientists and found to be suitable.

# Results

Bacterial leaf blight risk is most severe in the southwest and north east. The disease most commonly occurs in areas of high humidity and high temperatures. High rates of fertilization will favor disease development.

Brown spot risk follows a similar pattern as bacterial blight. The disease is also favoured by high temperatures but rather rice stressed by drought or low fertility rates favour disease development. Thus rainfed rice is often afflicted with this disease.

Leaf blast risk is less severe than the other two diseases examined here. This disease tends to be most severe in rainfed rice areas and upland areas where there are cooler temperatures and greater day-night time temperature differences that cause dew formation on the leaf. The risk of this diease is the highest in far northeast India but risk is also elevated in the mountainous regions of the southwest and far north.

# References

R Core Team (2015). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.

Robert Hijmans, Jorrel Aunario, Adam Sparks (2015) cropsim: Functions for use in the dynamic & mechanistic simulation of crop (plant) growth and development, and of plant diseases; and to implement these functions in a number of models. R package version 0.2.0-5. <https://r-forge.r-project.org/projects/cropsim/>

Robert J. Hijmans (2015). raster: Geographic Data Analysis and Modeling. R package version 2.4-20. <http://CRAN.R-project.org/package=raster>