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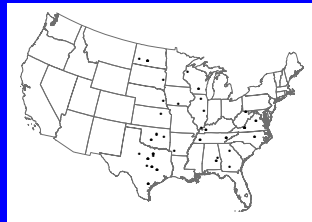
BACKGROUND

- To successfully establish biofuel systems, the production of biofuel must be biophysically feasible at the regional scale without causing other environmental problems.
- Switchgrass (*Panicum virgatum* L.) has been grown and extensively evaluated as an energy crop in the U.S. However, switchgrass has not been evaluated in California.
- In California, four field trials of switchgrass were established in 2007.
- To evaluate switchgrass under California's diverse environmental conditions, simulating it using a biogeochemical model is an option particularly when limited field data are available.

OBJECTIVES

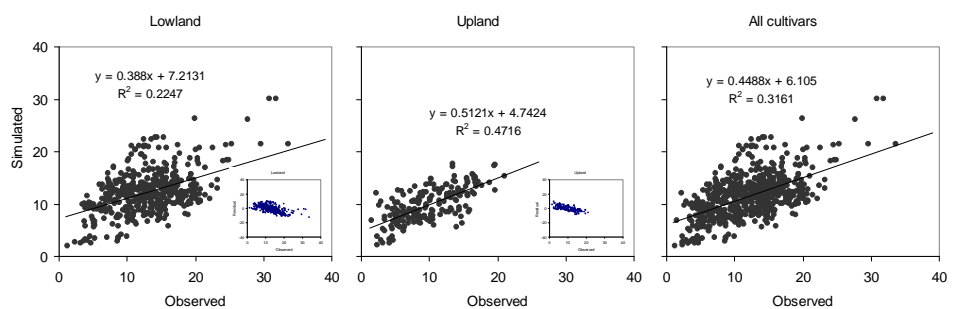
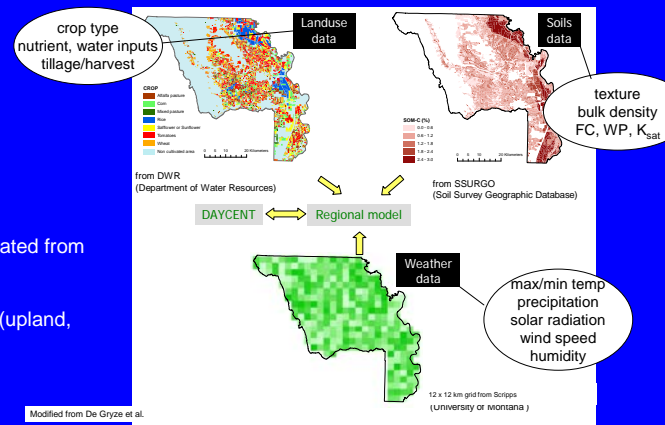
- To calibrate/validate the DAYCENT model using published data on switchgrass biomass production across the U.S. and data generated from the four field trials in California.
- To employ the model to estimate regional yield potential, soil C sequestration and greenhouse gas fluxes in switchgrass systems in California's Central valley.

MODEL CALIBRATION



Six cultivars were individually calibrated from the sites (see the map above):

- Dacotah, Sunburst, Trailblazer** (upland, northern)
- Cave-in-Rock** (upland, southern)
- Kanlow** (lowland, northern)
- Alamo** (lowland, southern)



Note: Each point represent a yield for certain site, year, and site-specific management for the year.

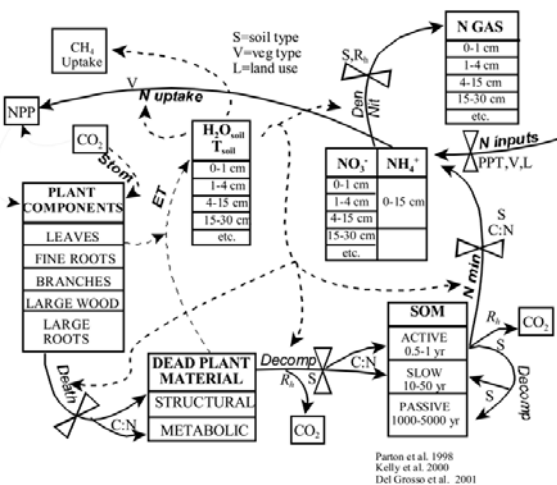
The model was initially calibrated using published data from sites, where the stand had been maintained for 3 to 10 years with N fertilization (ranging from 0 to 896 kg N ha⁻¹) and 1–4 harvests/year.

Biomass production of switchgrass was assumed to differ by intraspecific characteristics and it should be constant for the same cultivar anywhere during any growing season if there was no limiting factor. Therefore, we did not make site-specific but intraspecific adjustments to the crop parameterization for regional evaluations.

As expected, the observed yields varied considerably across the sites and by management practices. The model tends to overestimate the yields in the low range (0–5 Mg ha⁻¹) but underestimate in the high range (>20 Mg ha⁻¹) particularly for Alamo, Kanlow, and Cave-in-Rock. This suggests that the model may not simulate the effect of limiting factors realistically due to uncertainty in input parameters at several sites.

Nevertheless, there is a general agreement between the simulated and observed yields. The model reproduced the variability of the observed yields reasonably by management and stand age.

DAYCENT MODEL



FUTURE PLAN

- The model will be further calibrated/validated using the data from the four field trials in California.
- The yield potential of each cultivar will be evaluated in the Central valley of California at the regional scale.
- In addition, soil carbon sequestration and greenhouse gas emissions will be estimated under switchgrass production for California.

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