## "ROLLED-UPNESS"

## <u>J.T. Wood</u><sup> $\dagger 1$ </sup>, X.R.R. Sirault <sup>1,2</sup>

<sup>1</sup>The Australian National University, Canberra, Australia; <sup>2</sup>CSIRO Plant Industry, Canberra, Australia

<sup>†</sup>E-mail: *jeff.wood@anu.edu.au* 

The flag leaf of a wheat plant rolls up in response to drought conditions, and, hopefully, unrolls when conditions improve. This is a desirable trait, but how do we quantify it so that different varieties of wheat or different treatments can be compared objectively? We subjected strips cut from flag leaves to different degrees of drying and then photographed them. The images were skeletonised and digitised giving x,y coordinates of 18 points on each half of the strip. We need to define an appropriate measure of curvature or "rolled-upness" for the individual half strips which can be used as a response in the statistical analysis. We considered two approaches. The first was to use some property of the convex hull of the points. The second was to use smoothing splines to approximate the shape of the strips, and then to use a statistic derived from the splines. As usual with smoothing splines it is important to choose an appropriate degree of smoothing. The spline approach permits us to distinguish between upward and downward curvature, and to look at detailed properties of the rolling, such as the position on the strip where maximum curvature occurs.