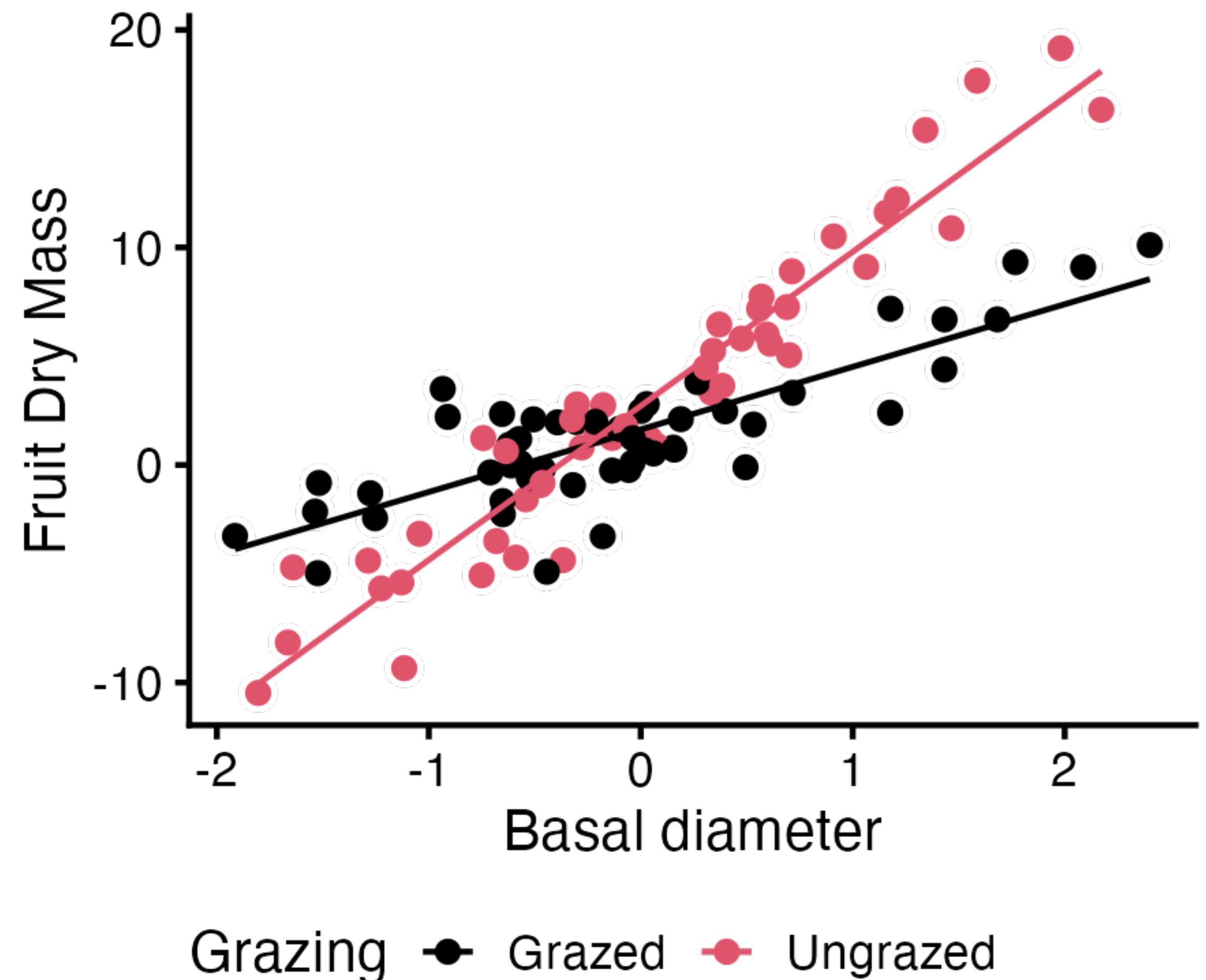# Interactions

Allowing coefficients to change according to other variables

- What if the relation between a predictor and an outcome changes depending on another predictor?

- We can account for this by adding product terms in the model

  - With two predictors, x and z:

$$\mu = \alpha + \beta_1 x + \beta_2 z + \boxed{\beta_3 xz}$$

Interaction term!

Example with interactions

- **Question**: what are the best soil moisture and light availability to grow tulips?

- Greenhouse experiment: beds of tulips kept in nine combinations of soil moisture and shading. Three replicates for each combination (total of 27 beds).

- **Response variable**: mean plant height in each bed

- **Predictor variables**:

  - Water: 3 levels (low, med, high)

  - Shade: 3 levels (low, med, high)