

Flavonoids play a key role in resistance to accumulation of aflatoxin in corn



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Research goal

Can we find a way to identify multiple key elements and pathways of corn resistance to *Aspergillus flavus* by doing major data integration analysis?

Importance

Aspergillus flavus is a fungus with many traits. This fungus colonizes crops such as corn, cottonseed, peanut and more. Some strains produce highly toxic and carcinogenic chemicals such as aflatoxin. Corn resistance to aflatoxin accumulation is a polygenic trait.

Objectives and experiments

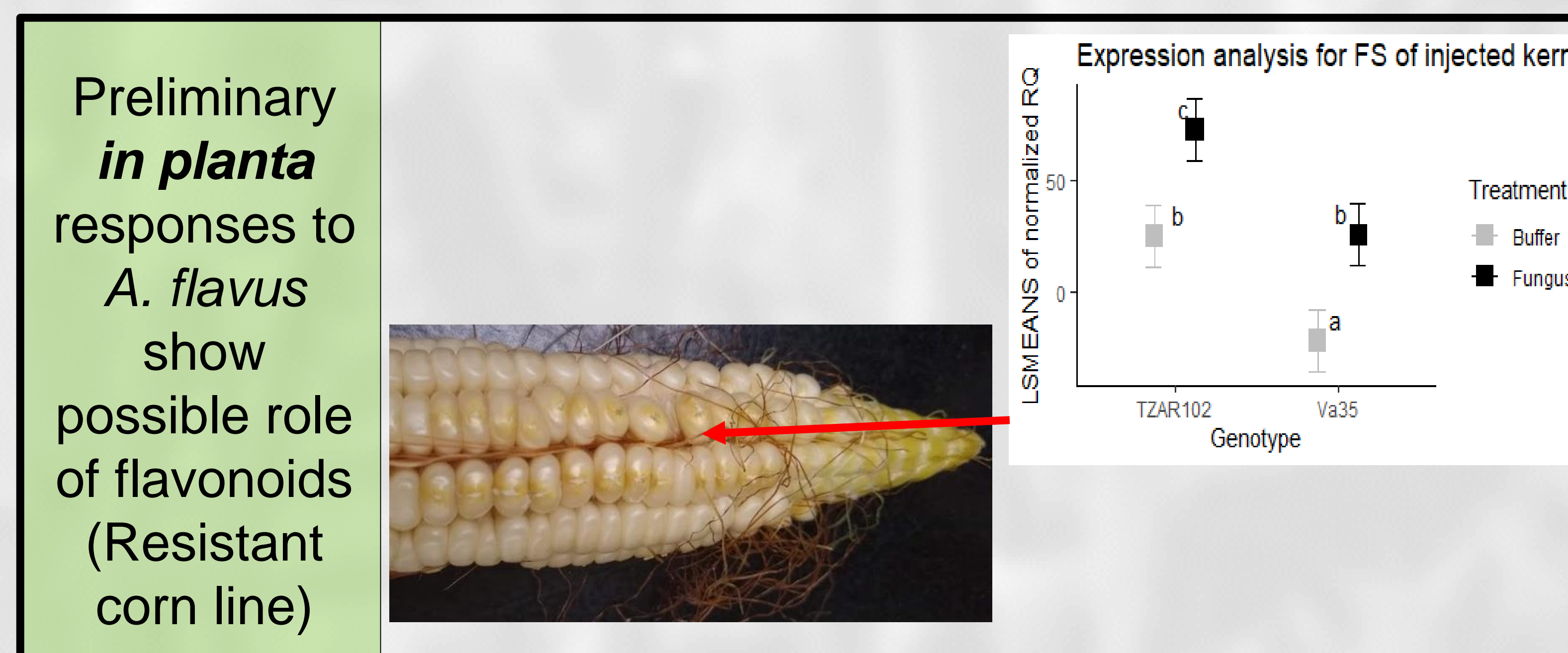
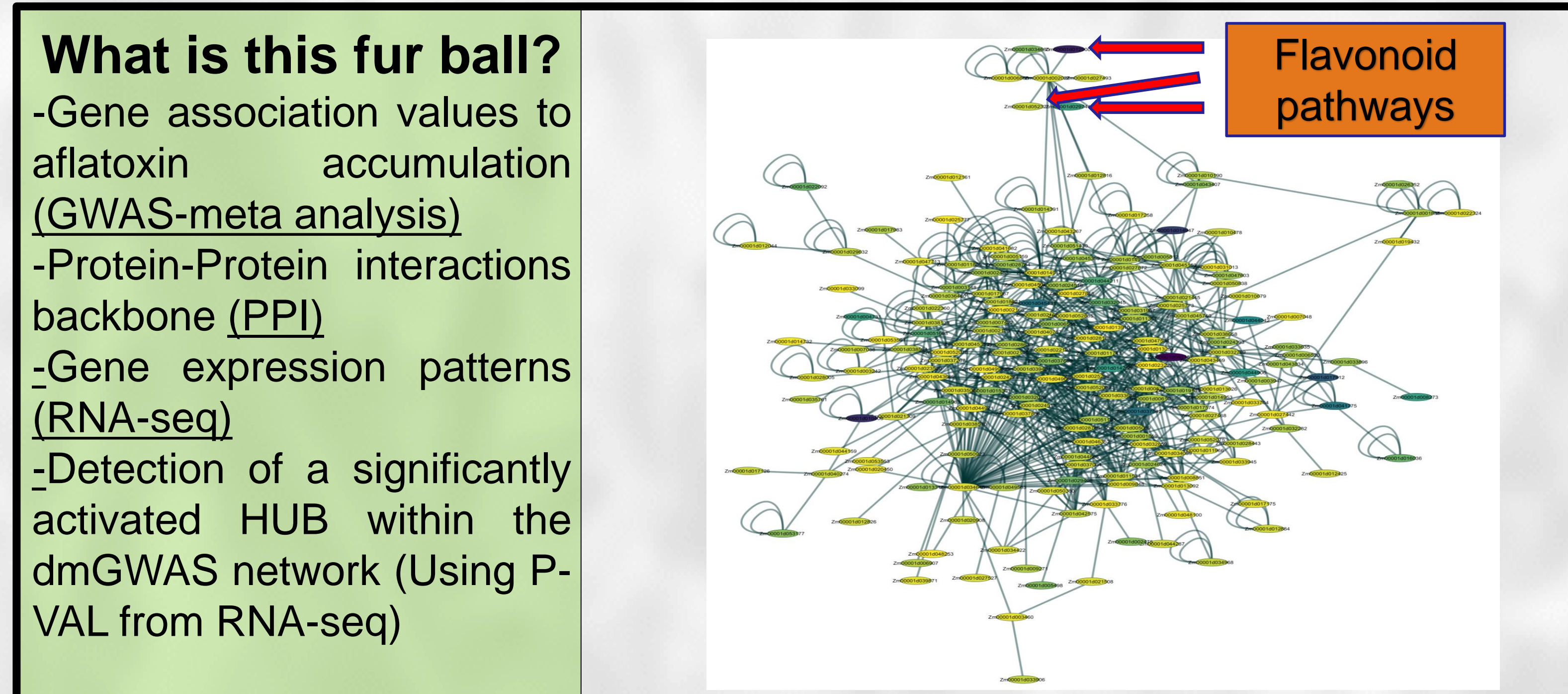
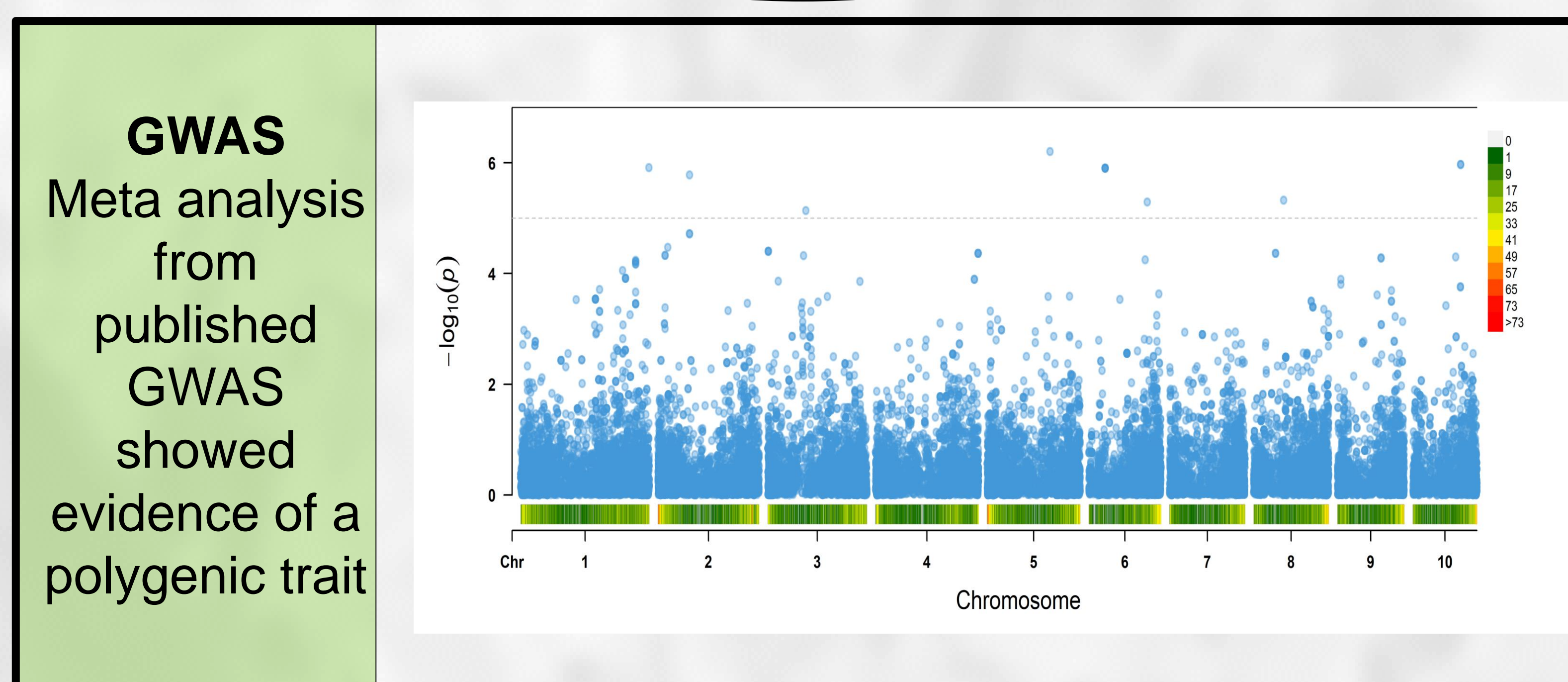
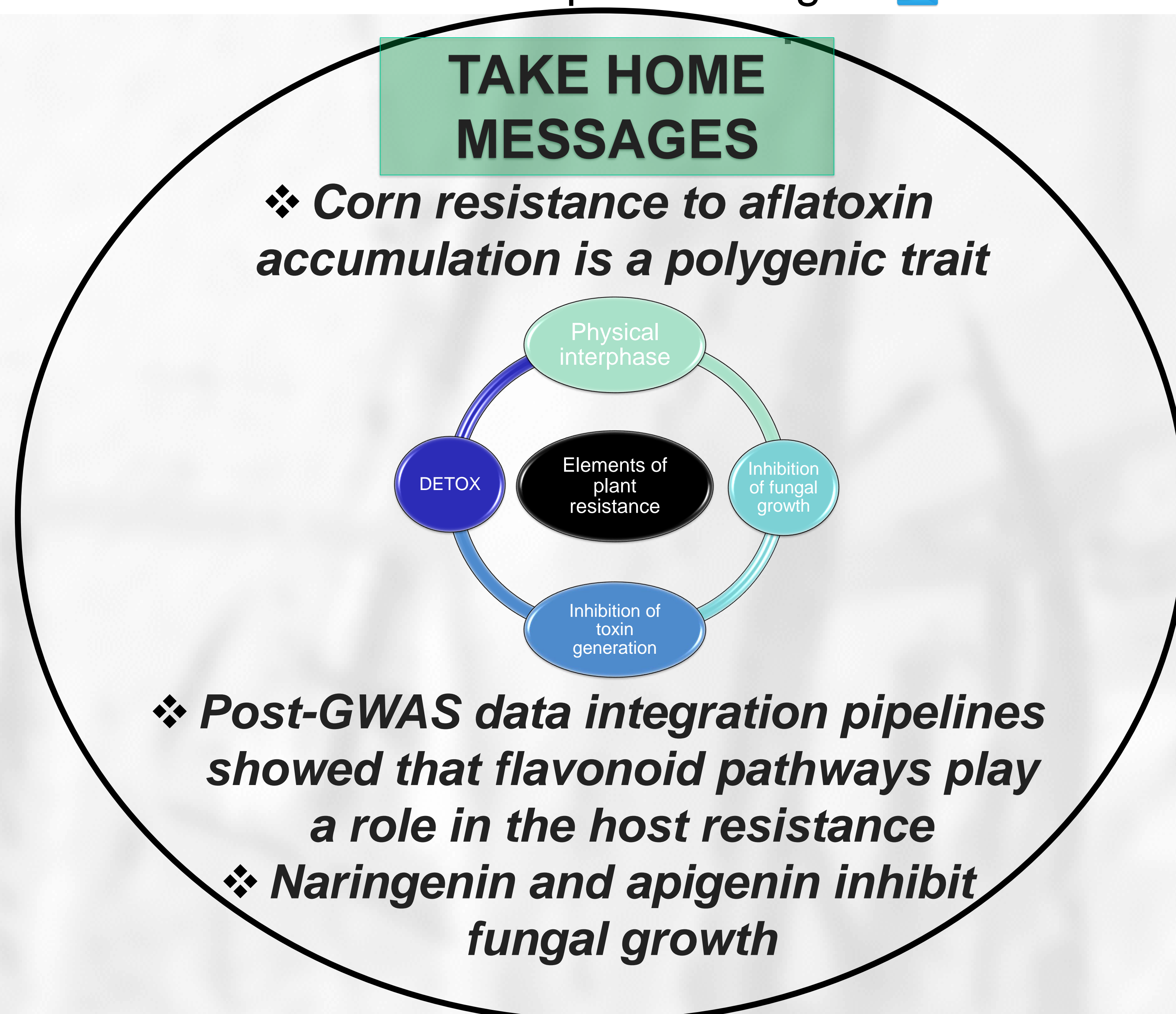
Obj. 1. Use GWAS phenotypic data to identify genes and pathways associated with corn resistance to aflatoxin accumulation

Obj. 2. Perform post-GWAS using RNA-seq data from kernel screening assay (KSA) of TZAR102 (Resistant line) and Va35 (Susceptible line)

1. GWAS
• Phenotypic field data and genomic data to run GWAS
• Warburton et al 2015

2. POST-GWAS
1. GWAS -> Multi-marker Analysis of GenoMic Annotation (Leeuw et al 2015)
2. PPI network (Musungu et al 2015)
3. RNA-seq data
Created a weighted network using dense module search (Wang et al 2015 and Xiao et al. 2019)

Final step
• All the results taken together:
Generated hypothesis of pathways to test for functional analysis



Bioassays: This are ongoing experiments targeting some of the metabolites of interest associated to resistance to aflatoxin accumulation

Functional genomics

96-wells Growth

Af70 and 3357

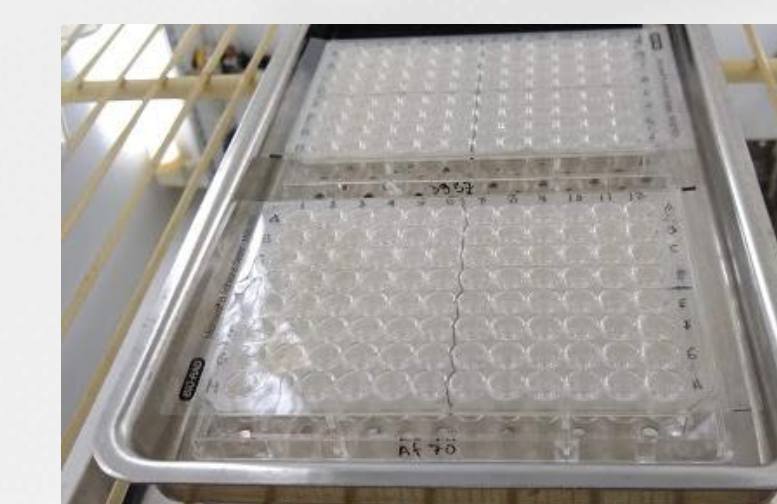
Several concentrations and controls

3 Technical replicates

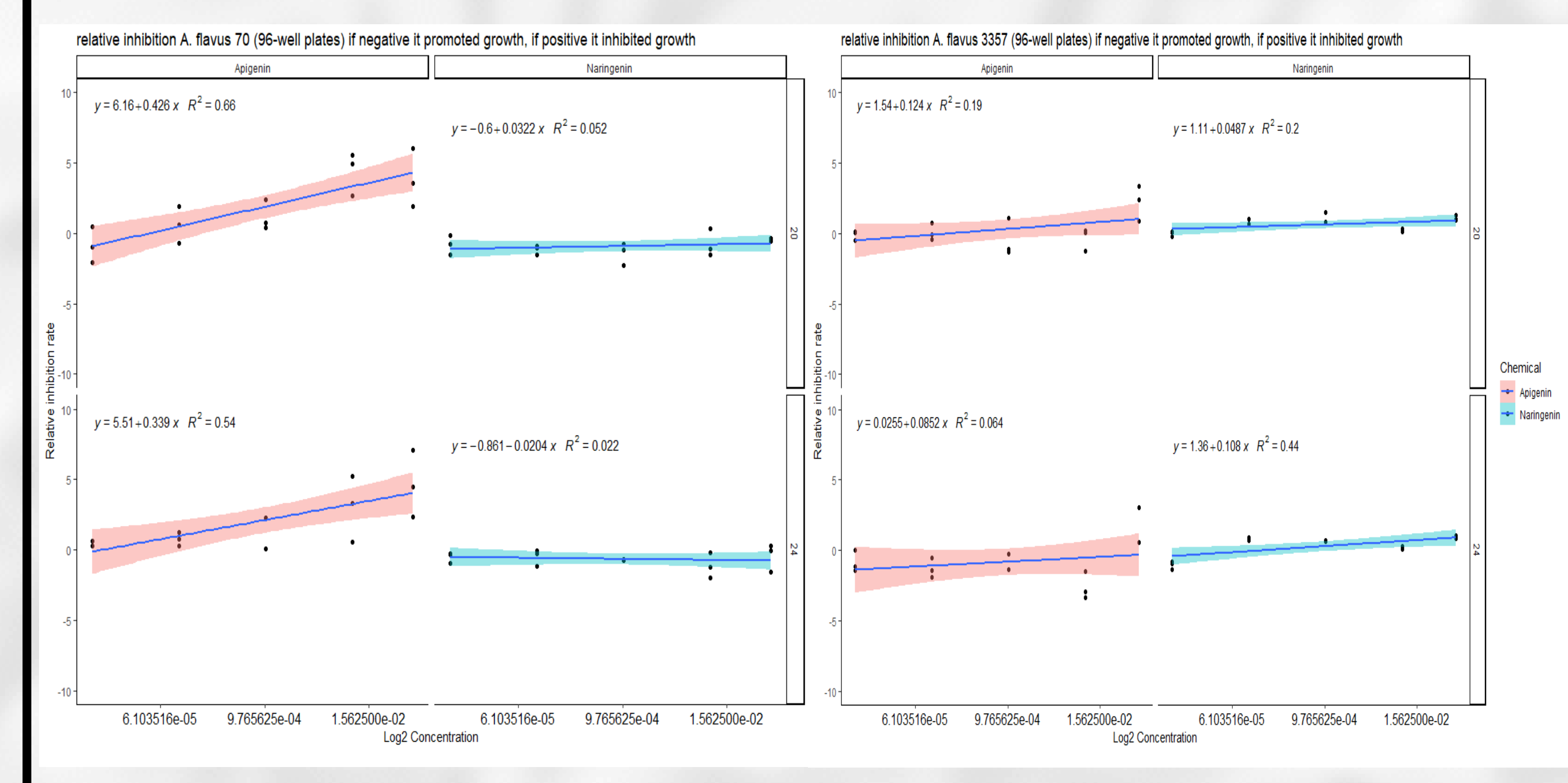
ABS 600nm

0, 20, 24h (30C)

- Flavonoids:**
- Naringenin
 - Apigenin
 - Luteolin
 - Luteolin-7-sugar
 - Control (Ethanol +Fungus)



Preliminary results showed:
Naringenin and apigenin have a high relationship with inhibition of fungal growth when incubated with *A. flavus* 70 and 3357 strains



We do not know:

- The directionality of the response
- The metabolite profile of the plant when infected (Flavones, flavonol and others)
- The effect of flavonoids over the fungus

What to do?

- ❖ Flavonoid profiles in planta assays -> Ongoing
- ❖ Fungal bioassays -> Ongoing

We know that flavonoid pathways are involved in the corn response to *A. flavus* infection

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