




Dynamics of root-associated fungal community of canola genotypes in Saskatchewan soils

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Canola

- **World's most important oilseed crop**
- **Canola oil is renowned for its nutritional qualities and industrial applications**
- **It is recommended to grow canola 1 year in 4 on the same field**
- **Canola is susceptible to several diseases**
- **Breeders continue to develop varieties with increased resistance to diseases**



Importance of canola root microbiome

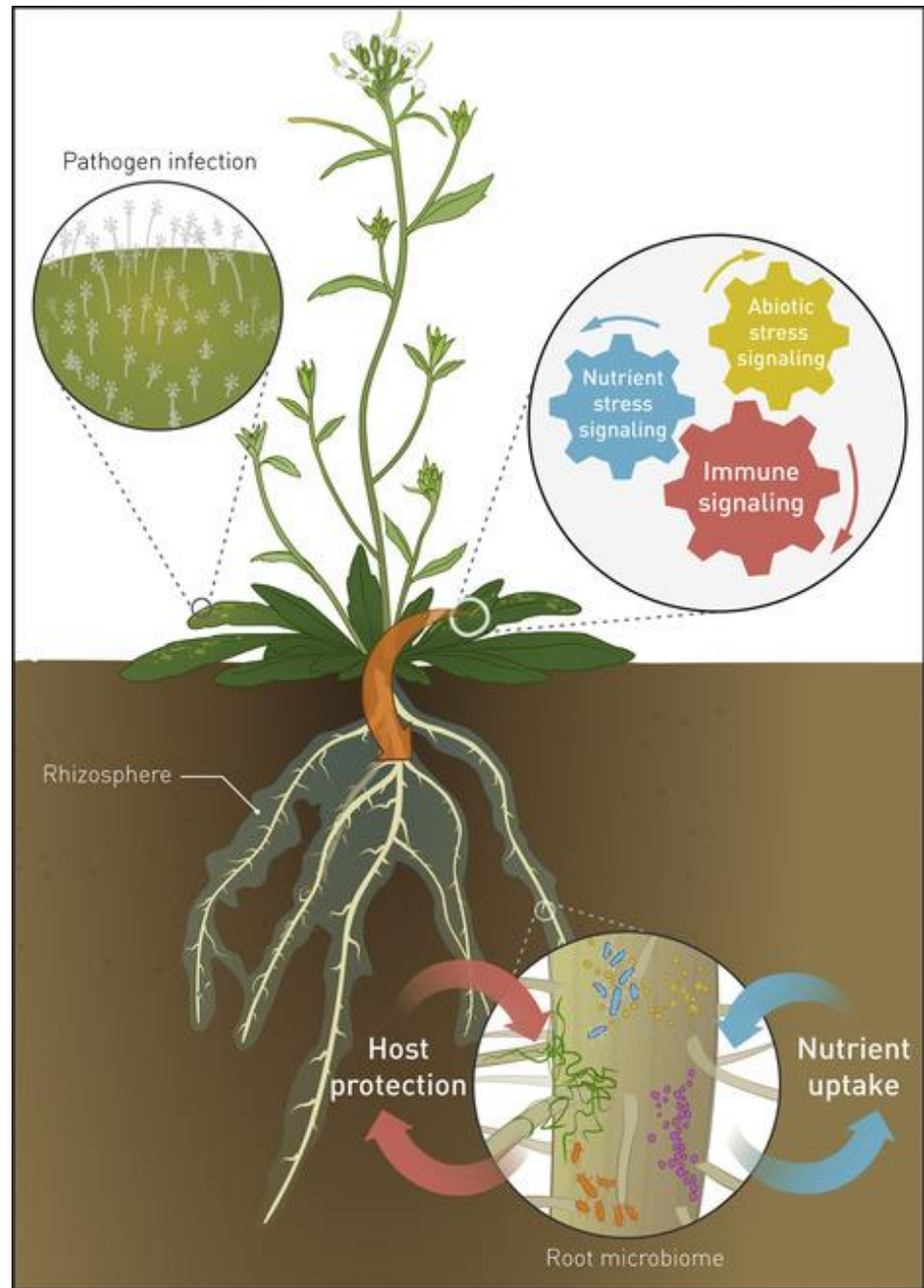
Profitable canola production relies heavily on adequate plant nutrition

Canola root system: root health and nutrient uptake capacity

Canola root microbiome: diversity, composition and dynamics



Rhizosphere



Experiment

Canola: 8 diverse genotypes (AAFC-NAM pop.)

Location: Llewellyn, SK

Years: 2016 & 2017

Sampling: 10 times - weekly

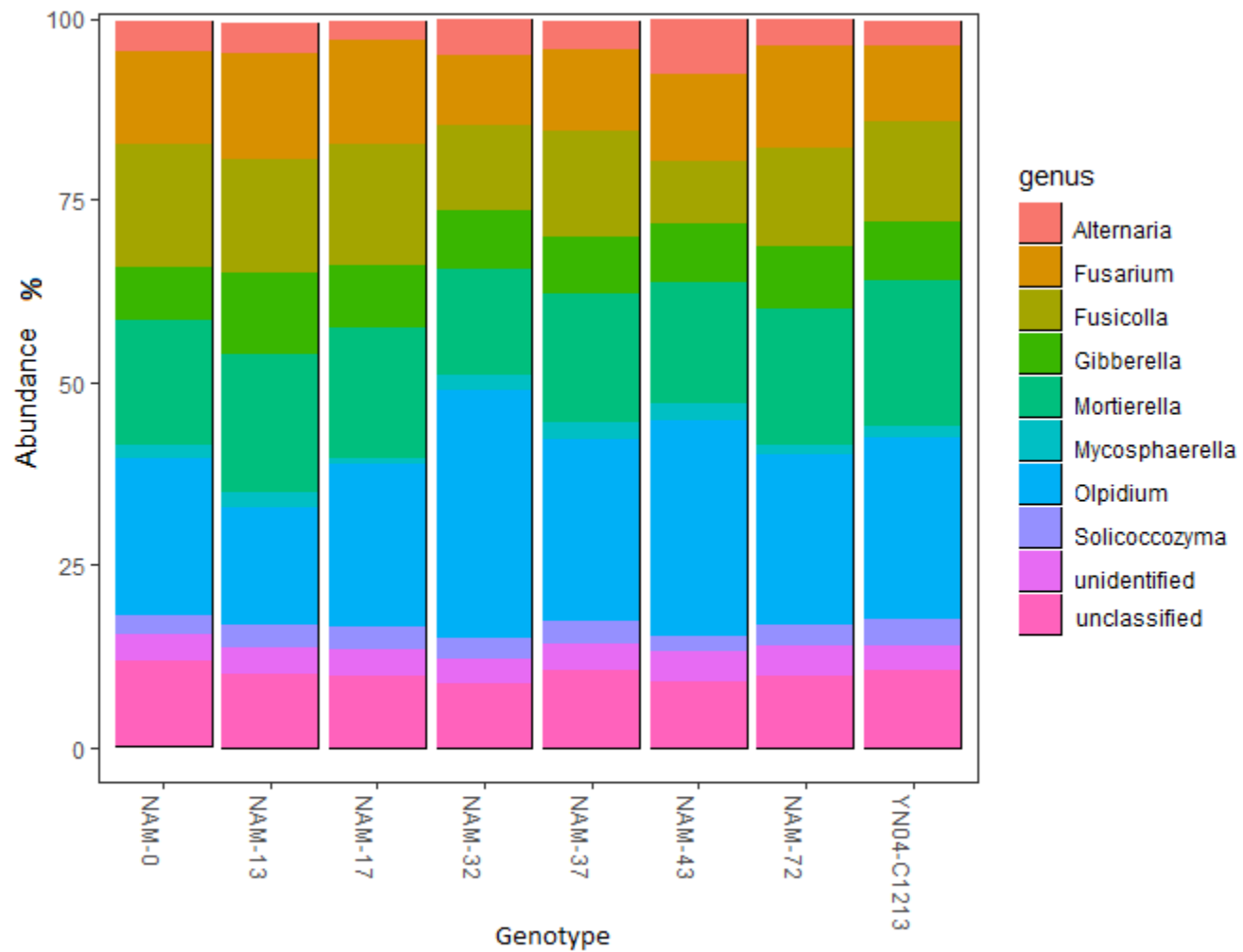
Material: Root and Rhizosphere

Analysis: DNA sequencing of fungal microbiome using universal fungal primers (ITS1-F / ITS2) on Illumina Miseq platform

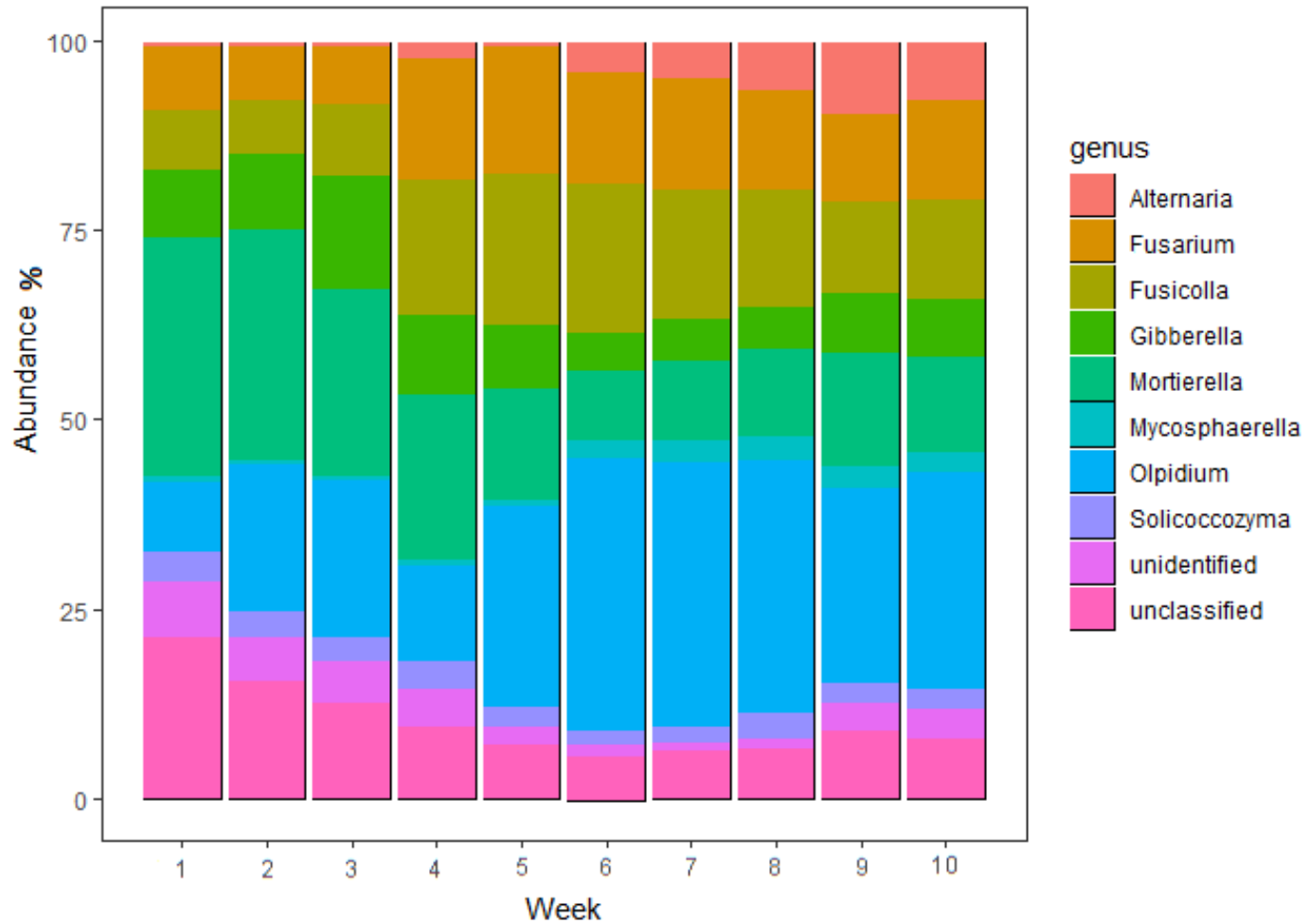
DADA2: Fungal community analysis: Single nucleotide variants (SNVs)



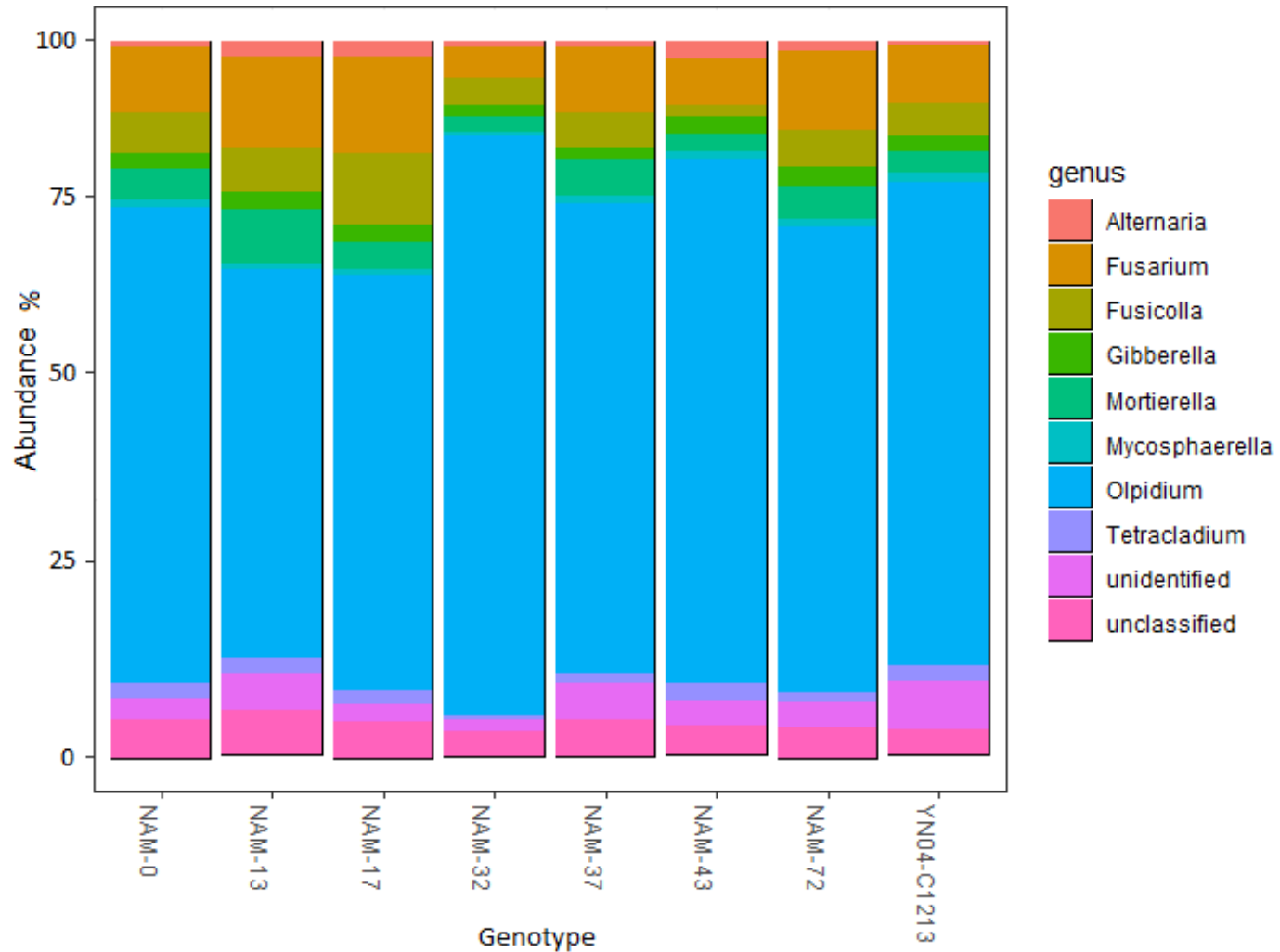
Dominant fungal genera in canola rhizosphere



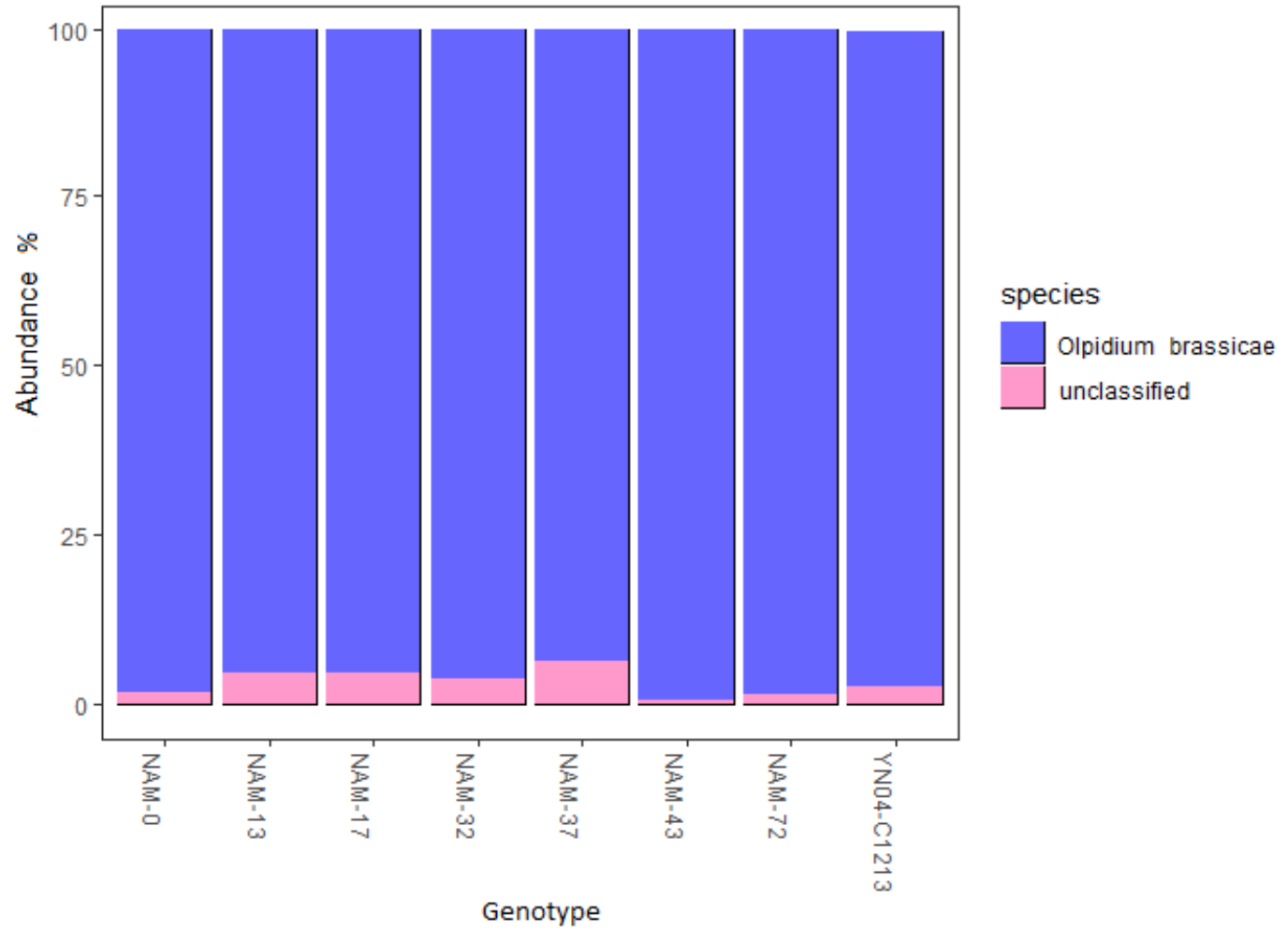
Fungal genera in canola rhizosphere over the growing season



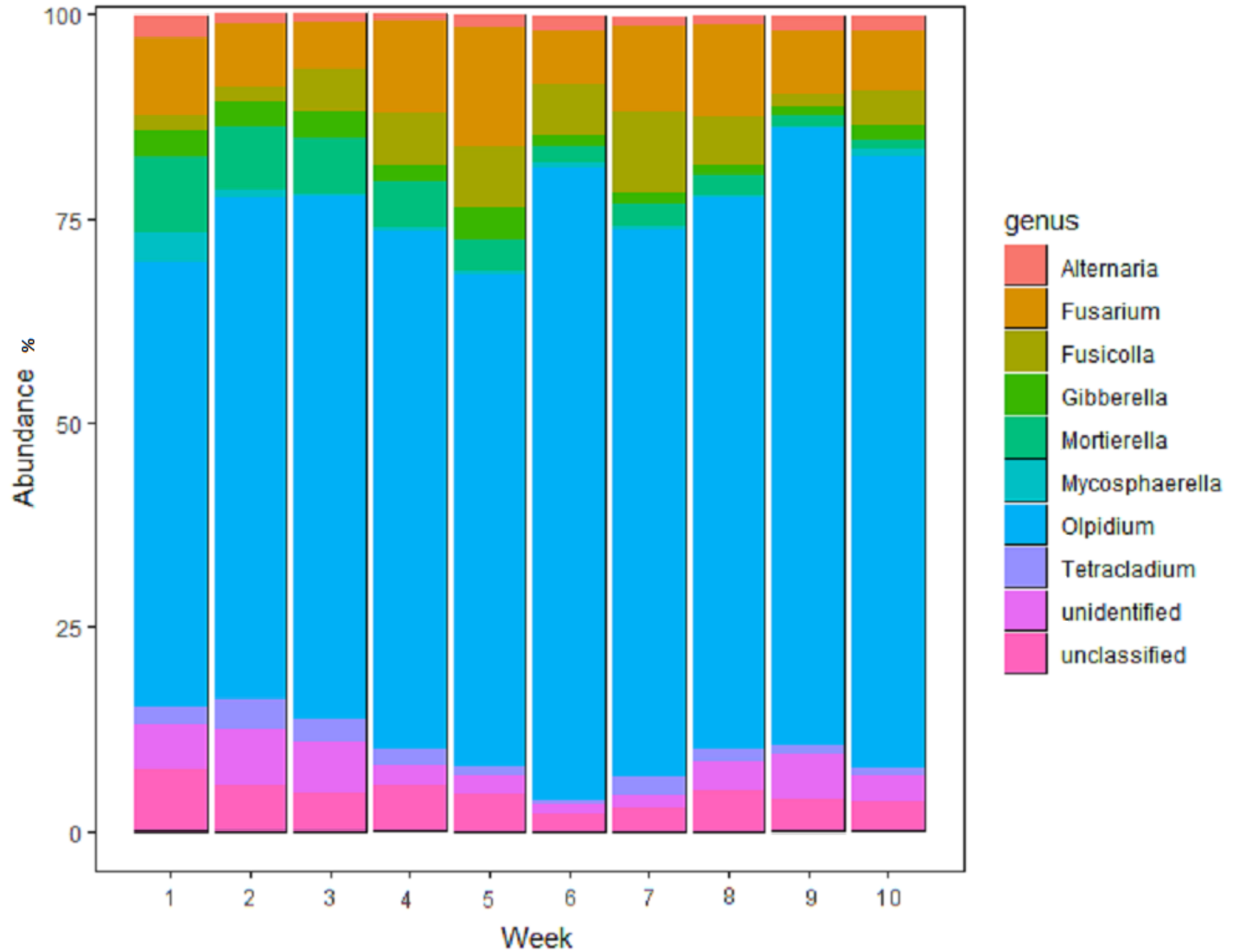
Dominant fungal genera in canola roots



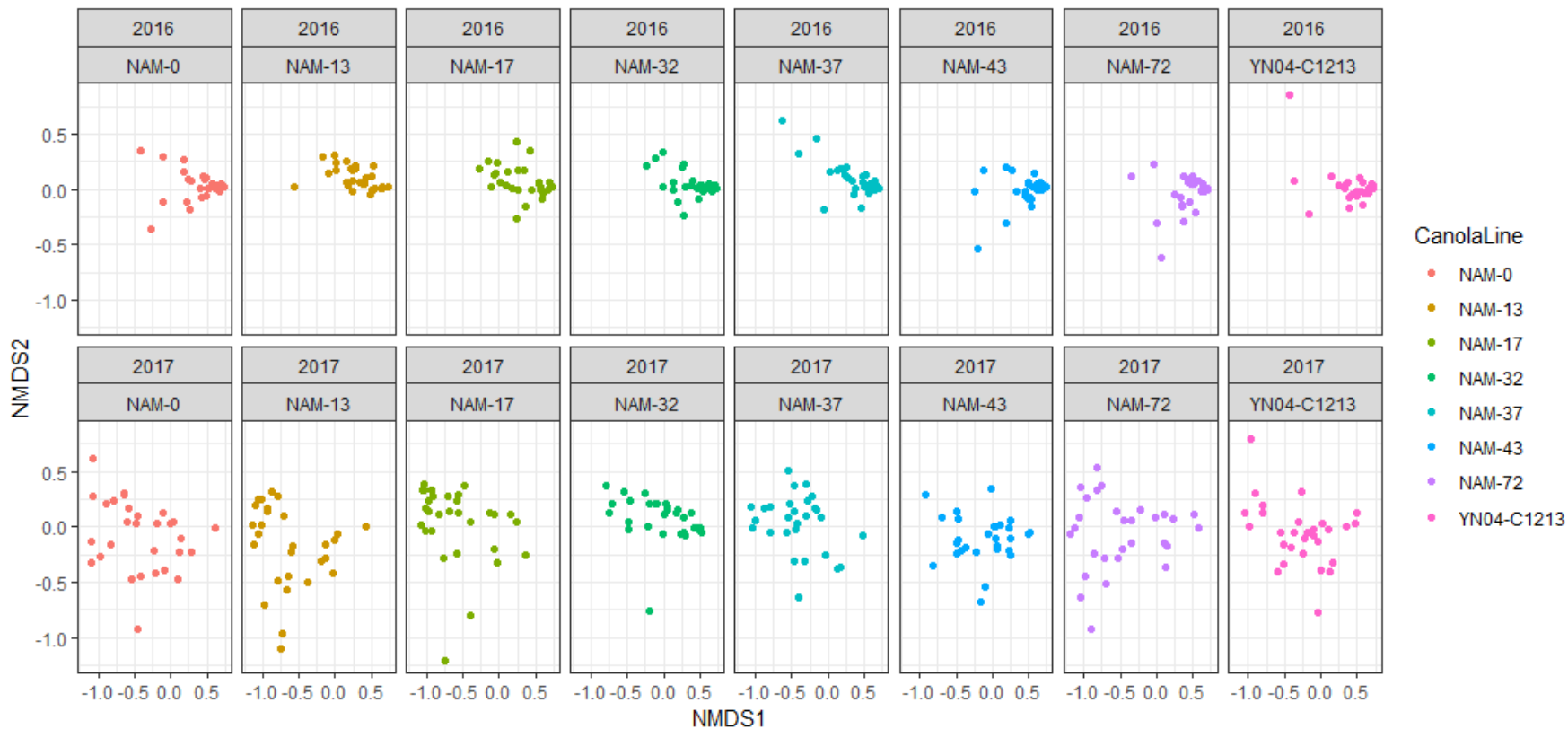
Olpidium brassicae in canola roots



Fungal genera in canola roots over the growing season

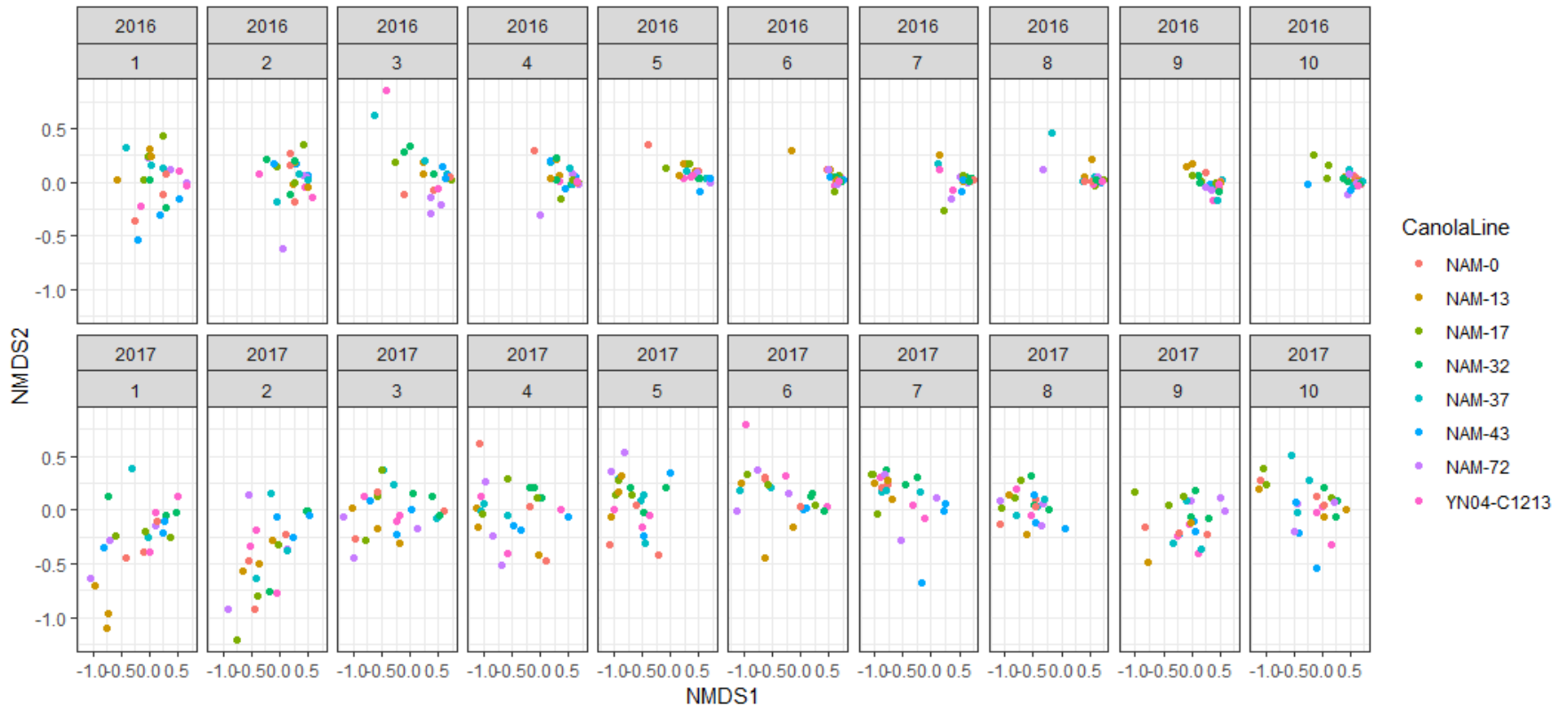


Fungal microbiome in roots of canola genotypes



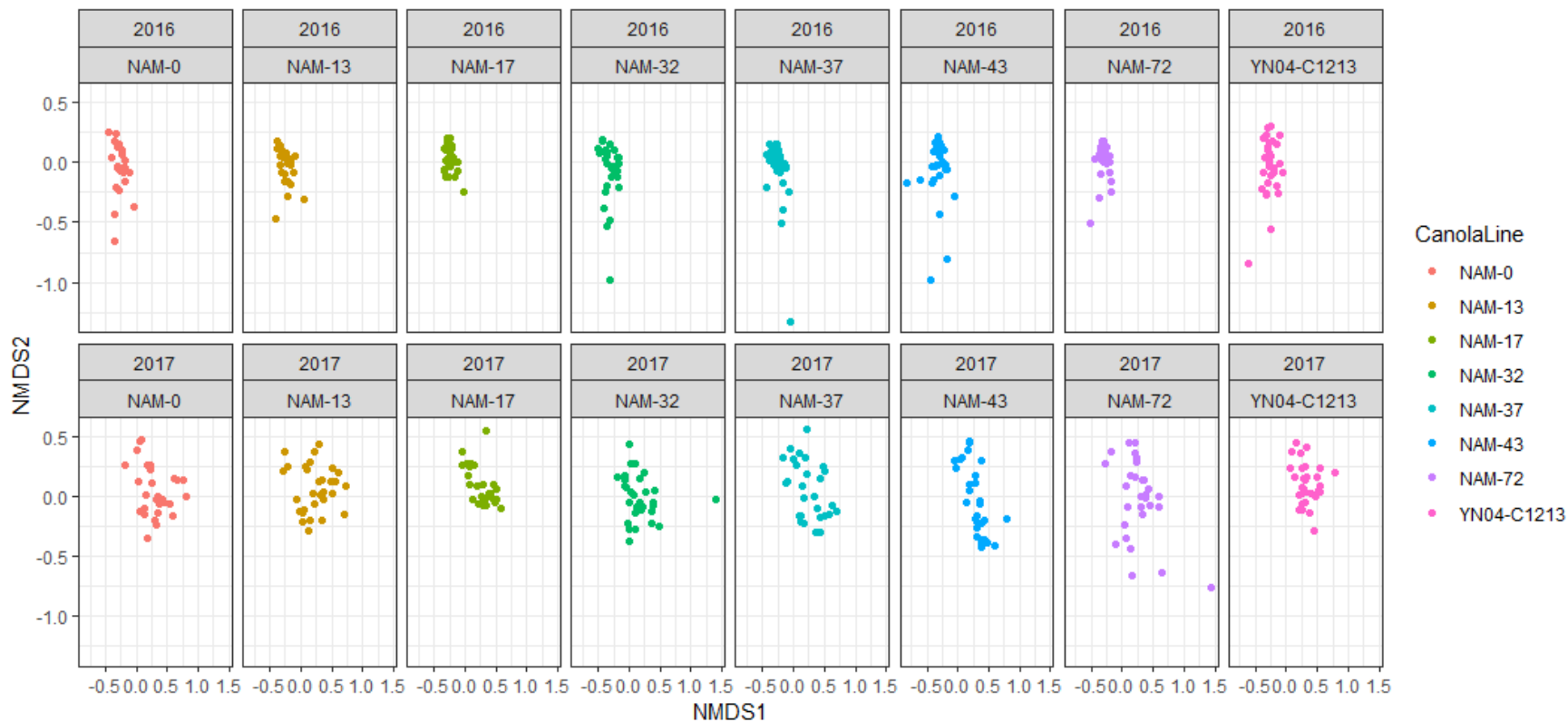
	Df	SumsOfSqs	MeanSqs	F.Model	R2	Pr(>F)
Genotype	7	2662	380.3	1.2778	0.01823	0.004**
Year	1	8967	8966.5	30.1322	0.06141	0.001***
Genotype : Year	7	2556	365.2	1.2271	0.01751	0.013*
Residuals	443	131825	297.6	0.90285		
Total	458	146009	1			

Fungal microbiome in canola roots over the growing season



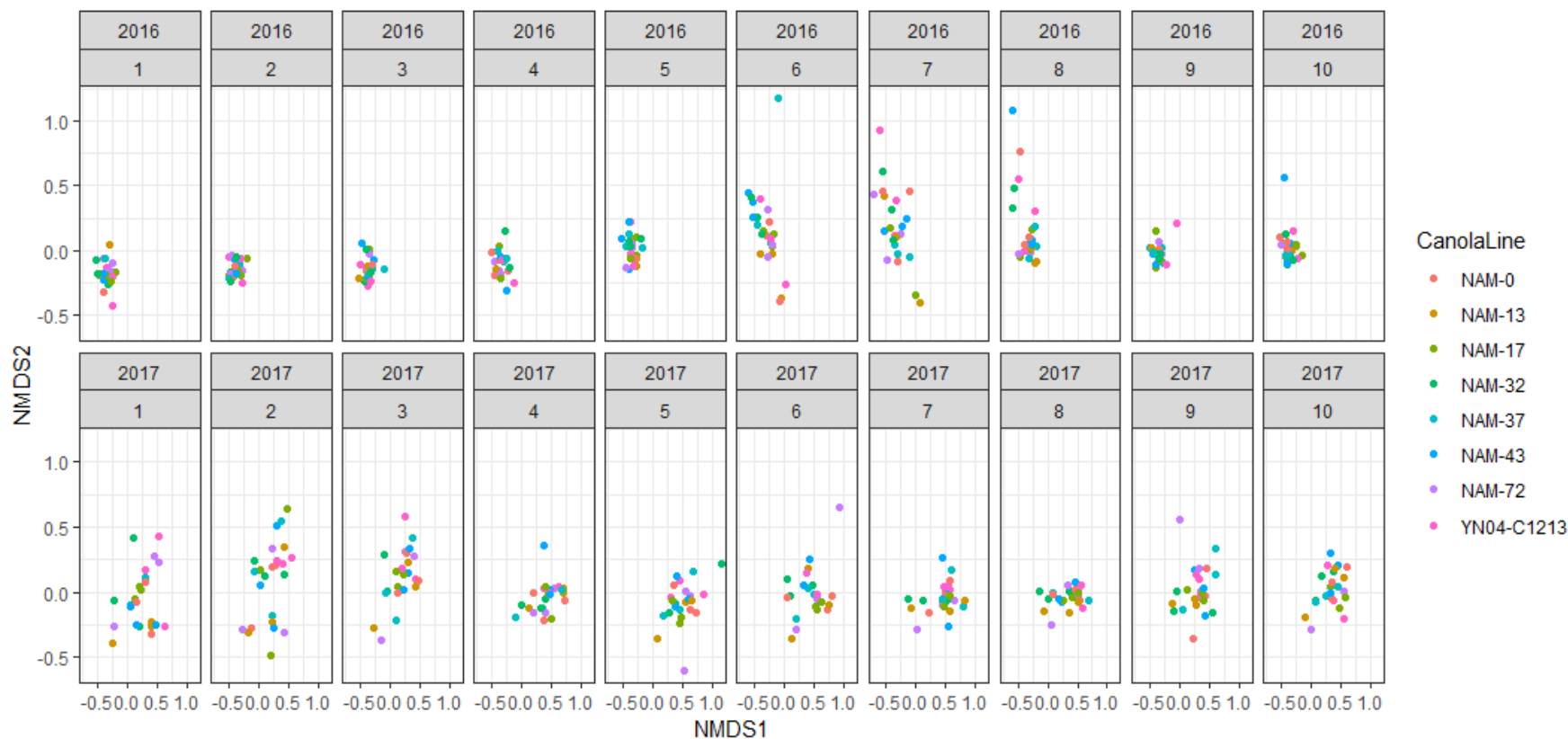
	Df	SumsOfSqs	MeanSqs	F.Model	R2	Pr(>F)
Genotype	7	2662	380.25	1.2077	0.01823	0.012*
Week	1	1651	1651.1	5.2439	0.01131	0.001***
Genotype : Week	7	2213	316.15	1.0041	0.01516	0.452
Residuals	443	139483	314.86		0.9553	
Total	458	146009	1			

Fungal microbiome in the rhizosphere of canola genotypes



	Df	SumsOfSqs	MeanSqs	F.Model	R2	Pr(>F)
Genotype	7	4446	635	1.649	0.02045	0.002**
Year	1	36618	36618	95.053	0.16844	0.001***
Genotype : Year	7	4135	591	1.533	0.01902	0.006**
Residuals	447	172202	385	0.79209		
Total	462	217401	1			

Fungal microbiome in the rhizosphere of canola over the growing season



	Df	SumsOfSqs	MeanSqs	F.Model	R2	Pr(>F)
Genotype	7	4446	635.1	1.394	0.02045	0.025*
Week	1	6586	6586.1	14.4557	0.03029	0.001***
Genotype : Week	7	2711	387.3	0.8501	0.01247	0.878
Residuals	447	203657	455.6	0.93678		
Total	462	217401	1			

Summary

- Canola genotype and environmental conditions shape the root fungal microbiome
- Root fungal microbiome changes over the growing season
- Environmental conditions can override the effect of genotype on the composition of root microbiome

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