

**Composition and properties of mucilages
from Colocasia, Xanthosoma and Dioscorea**

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Mucilages/gums/hydrocolloids

- Polysaccharides/polysaccharide-protein complex
- Arabinogalactan, galactomannan, glucomannan, mannan etc
- Food application – viscosity, pH and temperature stability
- Pharmaceutical application – anti inflammatory, immunomodulatory, antioxidant, hypoglycaemic and hypolipidaemic properties

- **Isolation and purification**
- **Viscosity properties**
- **Digestibility**
- **Bio active properties**

Isolation and purification

- **Crude mucilage – aqueous, acid, and alkali extraction – precipitation with ethanol/acetone**
- **Partially purified – removal of starch and protein**
- **Purified – gel filtration / ion exchange chromatography**

Yield and composition of mucilage from *Colocasia*, *Xanthosoma* and *Dioscorea* species

Species	Yield (%)	Carbohydrate (%)	Protein (%)
<i>Colocasia</i> (TCA)	1.0	95	5
<i>Xanthosoma</i> (TCA)	0.8	92	7
<i>D.esculenta</i>	2.0 (1.0)	40(75)	50(25)
<i>D.alata</i>	1.5(0.8)	40(80)	50(20)
<i>D.rotundata</i>	1.0(0.7)	30(70)	60(30)

() – after removal of protein

- Purified mucilage obtained as single peak using Sepharose CL 6B
- Electrophoretic protein profile
Colocasia & *Xanthosoma* –major band 25kDa
Dioscorea species -major band 45kDa

Monosaccharide composition

Acid hydrolysis - identification of sugars

Colocasia &
Xanthosoma - arabinose, galactose

Dioscorea spp - mannose

Viscosity

Species	Relative viscosity (0.5% mucilage)
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<i>Colocasia</i>	7.0
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<i>Xanthosoma</i>	4.5
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<i>D.esculenta</i>	9.0
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<i>D.alata</i>	3.5
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<i>D.rotundata</i>	3.5
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Viscosity decreases by 50% at acidic pH and by 20% at alkaline pH - Not affected by temperature

Digestibility

α -amylase (pancreatic & salivary) No reducing sugar released

Amyloglucosidase

Trypsin / Chymotrypsin No TCA soluble component released

Effect on Digestive Enzymes

Species	% inhibition		
	S.Amylase	P.Amylase	Amyloglucosidase
Colocasia-C 2.5- 10 mg	6-30	5-35	Nil
Colocasia-P	Nil	Nil	Nil
Dioscorea-C 2.5-10mg	25-80	22-75	Nil
Dioscorea-P	Nil	Nil	Nil

Bio active Properties

1. Anti-Inflammatory Activity (200mg/kg bw)

Species	% inhibition of rat paw oedema
<i>Colocasia</i>	40
<i>D. esculenta</i>	52
<i>D. alata</i>	50
<i>D. rotundata</i>	56

Bio active Properties

2. Hypoglycaemic & Hypolipidaemic Actions (Mucilage administered orally at 4mg/100g b.wt)

Parameter	<i>Colocasia</i> (Percentage)	<i>Dioscorea</i> Inhibition)
Blood Glucose	17.0	9.5
Tot. Cholesterol	16.0	16.2
S. Triglyceride	37.5	44.0
Liver Triglyceride	17.0	22.0
Aorta Triglyceride	10.0	20.0

Summary

- Mucilage could be isolated from tubers of *Colocasia* and *Xanthosoma* using cold 10% TCA with a yield of approximately 1% fw. The major monosaccharides were arabinose and galactose. These mucilages were associated with a 25 kDa protein.
- Mucilage isolated from tubers of 3 *Dioscorea* species were composed of polysaccharide and protein in various proportions. The approximate yield was 1-2% fw. The major monosaccharide was mannose. These mucilages were associated with a 45 kDa protein.

- **The viscosity of *D.esculenta* was highest followed by *Colocasia* and *Xanthosoma*. It was lowered at acid pH but stable at high temperature.**
- **The mucilages were not digestible. Crude mucilages inhibited α -amylase. Inhibitory activity was associated with the protein component.**
- **The mucilages possessed anti-inflammatory property and had hypolipidaemic activity.**