

Extraction and Quantification of Hydrolyzable Tannins in Acorns from Different Species of Oak Trees (*Quercus spp.*)

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Introduction:

Do white-tailed deer (*Odocoileus virginianus*) prefer to eat certain types of acorns based on tannin content?

Hydrolyzable tannins consist of gallate groups connected via ester linkages to a carbohydrate (D-glucose)

The Prussian Blue method was used to determine hydrolyzable tannin content

Methods:

Acorns were dried and ground into powder

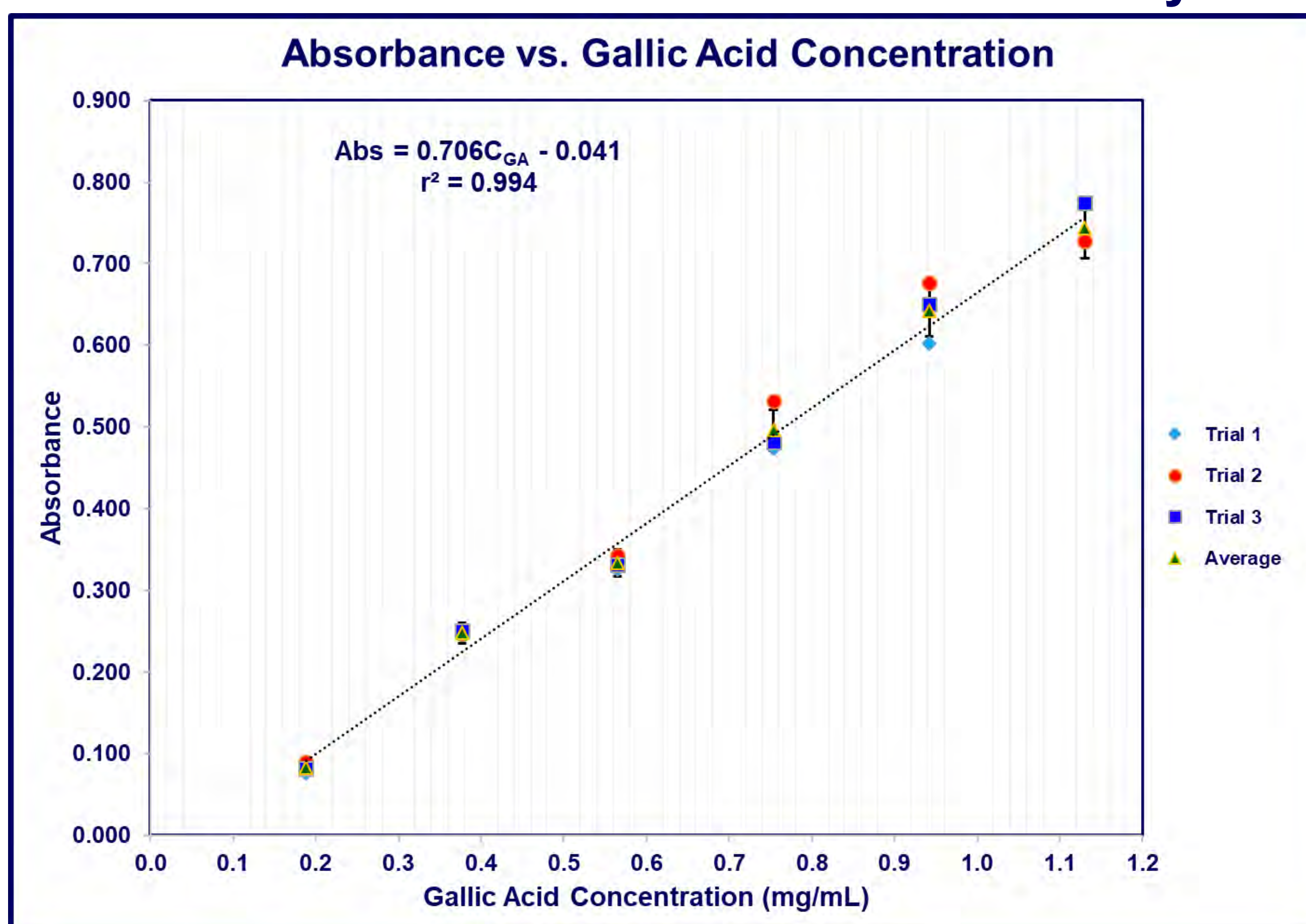
Fats were removed by stirring acorn powder in hexane/heptane

Tannins were extracted overnight at reflux in 80% MeOH/H₂O

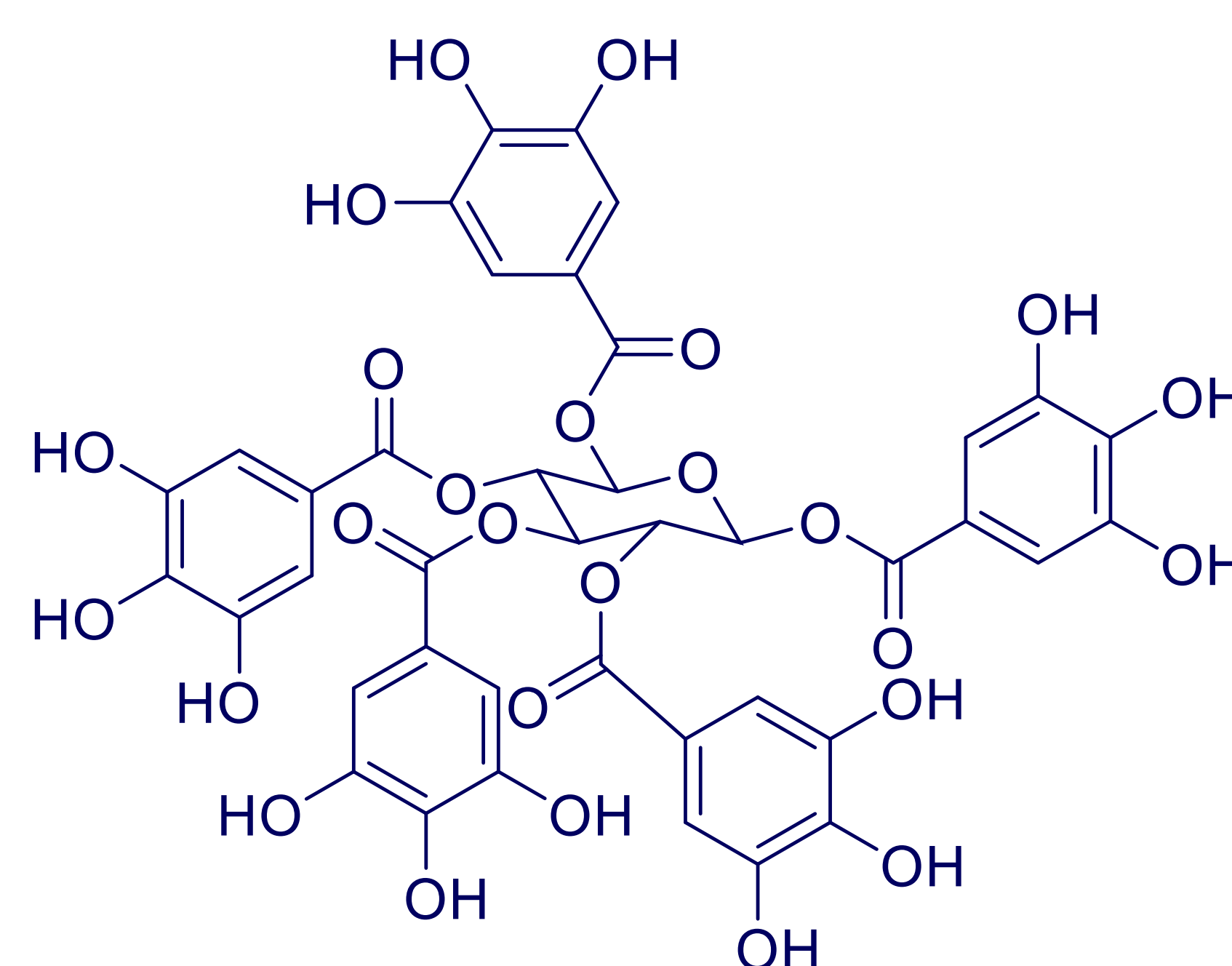
Extract was analyzed using Prussian Blue method^{1,2}

Spectrophotometric analysis was performed using gallic acid as a standard

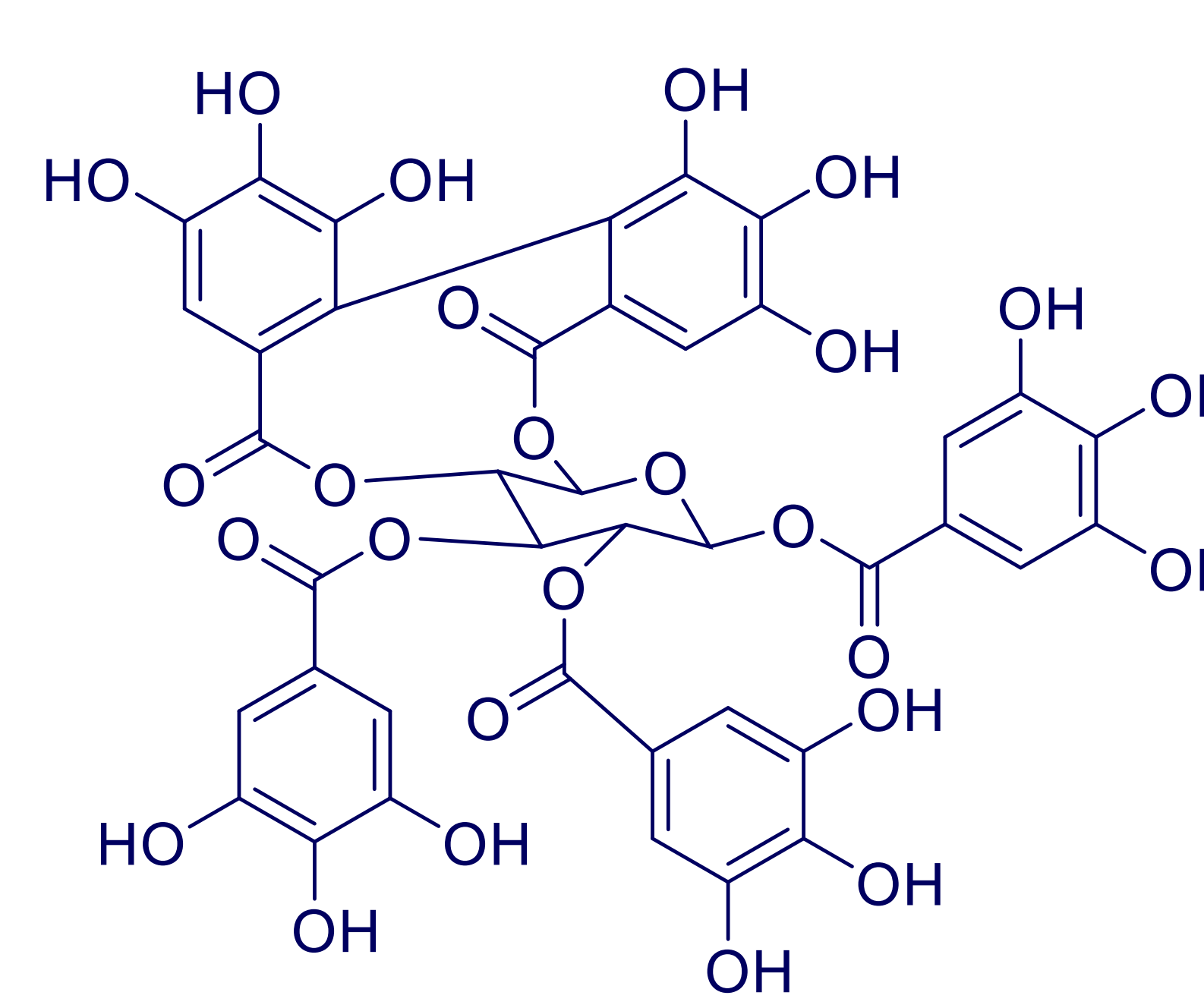
Calibration Curve for Prussian Blue Analysis



Hydrolyzable tannin structures:



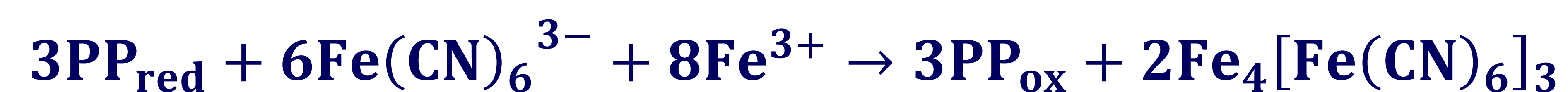
Gallotannin



Ellagitannin

Results:

Prussian Blue Reaction:



PP_{red} = reduced form of polyphenol
PP_{ox} = oxidized form of polyphenol

Results of acorn analysis

Oak Species	Total Phenolic Content (mg GAE [†] / g acorn)
Overcup Oak (<i>Q. lyrata</i>)	2.4 ± 0.3
Live Oak (<i>Q. virginiana</i>)	3.8 ± 0.8
Swamp Chestnut Oak (<i>Q. michauxii</i>)	4.9 ± 0.7
White Oak (<i>Q. alba</i>)	5.2 ± 0.5
Water Oak (<i>Q. nigra</i>)	5.6 ± 0.7
Shumard Oak (<i>Q. shumardii</i>)	6.3 ± 0.8

[†]GAE = gallic acid equivalent

Conclusions:

- Results are comparable to those from analysis of acorn samples from Poland³
- ATCOFA researchers are testing dietary preferences of white-tailed deer for various acorns in collaboration with the USDA

Future Work:

- Determination of condensed tannin content in current acorn samples using the acid-butanol method
- Analysis of acorns from other varieties of *Quercus*

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References:

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