



Medicinal Plants of Peru: Respiratory Treatments

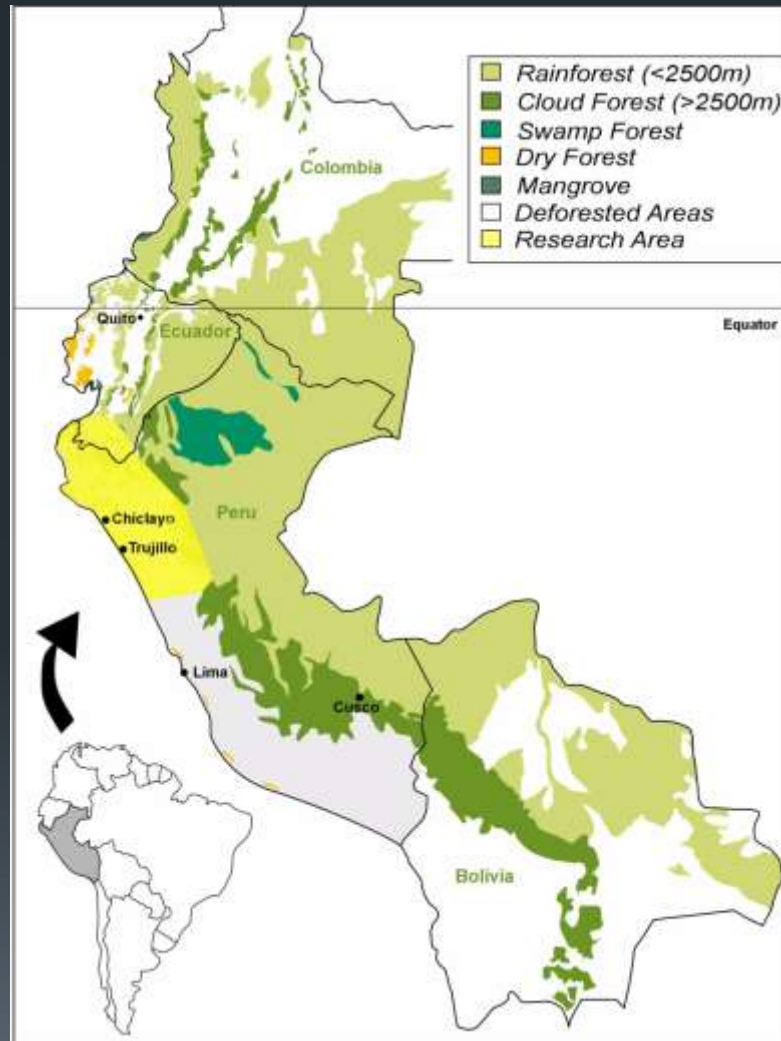
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Alyse Kuhlman, Jessica, Griffard, Andrew Townesmith,
Eric Feltz.

Introduction

- Traditional medicine use is growing in the world
- Northern Peru is key place in use and discovery of plant medicines
- Peru's plant medicines are being studied to observe what was used historically and what is used now
 - Ideally historical knowledge is preserved and given back to those to whom it belongs.
- An interest was taken in what plants were used in treating respiratory illnesses.



Research Area



Materials and Methods: Markets and Plants

- Herbal medicine data of market vendors were collected by Rainer Bussmann et al.
- Plants that were used was documented using numerical values 1 and 0 to represent presence in absence
- R Statistical Framework Vegan package was used to make distance measures of the data
- Data was clustered using method “Bray” and plotted as a dendrogram to observe and compare dissimilarities.
- Observations were made, noting dissimilarities between current plant use of market vendors and healers and historical surveys of plant use.



Material and Methods: Respiratory Plant Mixtures



- Presence absence data of medicinal plant mixtures was analyzed using cluster dendrograms with the R Statistical Framework vegan package.
- A separate cluster tree was created for data containing only information about respiratory plant mixtures
- Clustering of respiratory ailments on the respiratory tree were compared with how they clustered in the full list of illness mixtures
- Plants within the mixtures were reviewed to understand better how each mixture treats the various illnesses

R Statistical Framework

RGui (64-bit)

File History Resize Windows

R Console

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> > specr.dist<-vegdist(sourcesr)
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> > specr.clusters<-hclust(specr.dist)
Error: unexpected '>' in ">"
> > plot(specr.clusters)
Error: unexpected '>' in ">"
> sourcesr<-read.table('sourcesr.csv',h=T,sep=',',fill=0)
> sourcesr<-sourcesr[sourcesr$code!="",]
> row.names(sourcesr)<-sourcesr[,1]
> sourcesr<-sourcesr[,-1]
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> plot(sourcesr.clusters)
> sourr.dist<-vegdist(t(sourcesr))
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> plot(sourcecv.clusters)
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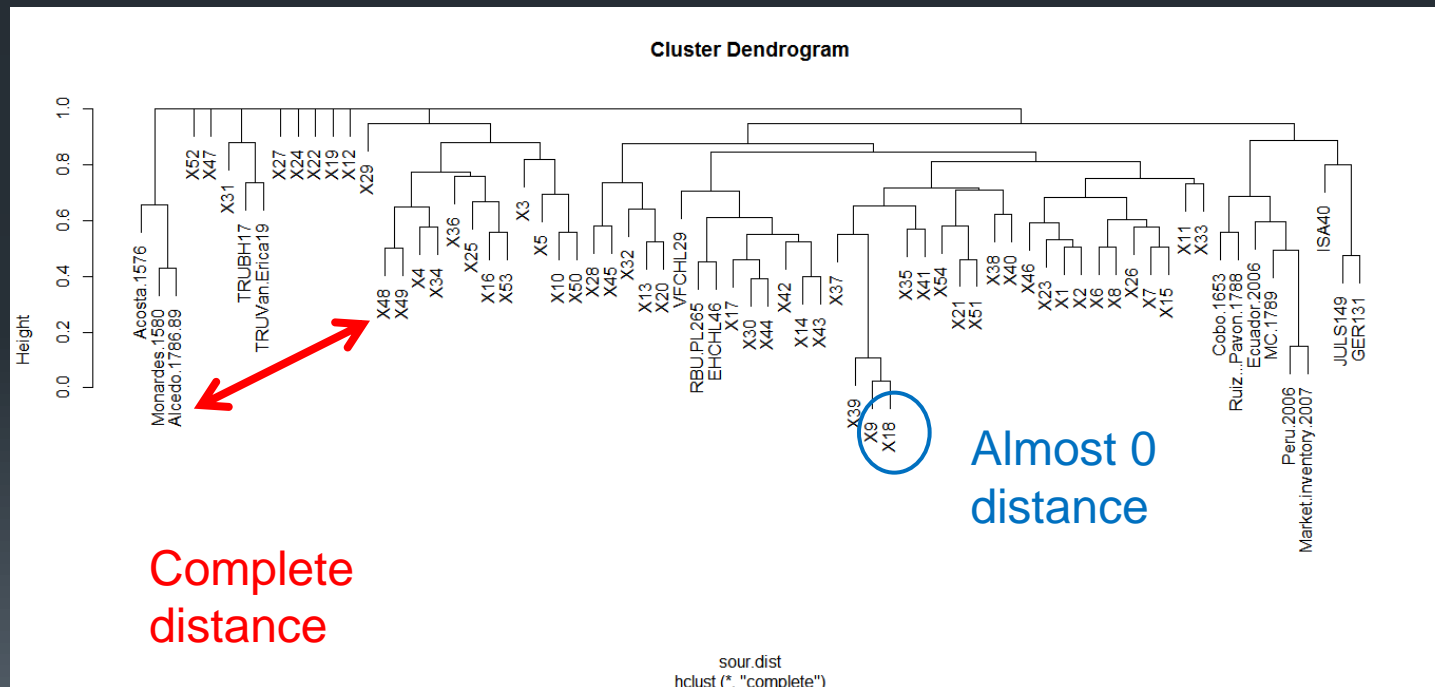
R Graphics: Device 2 (ACTIVE)

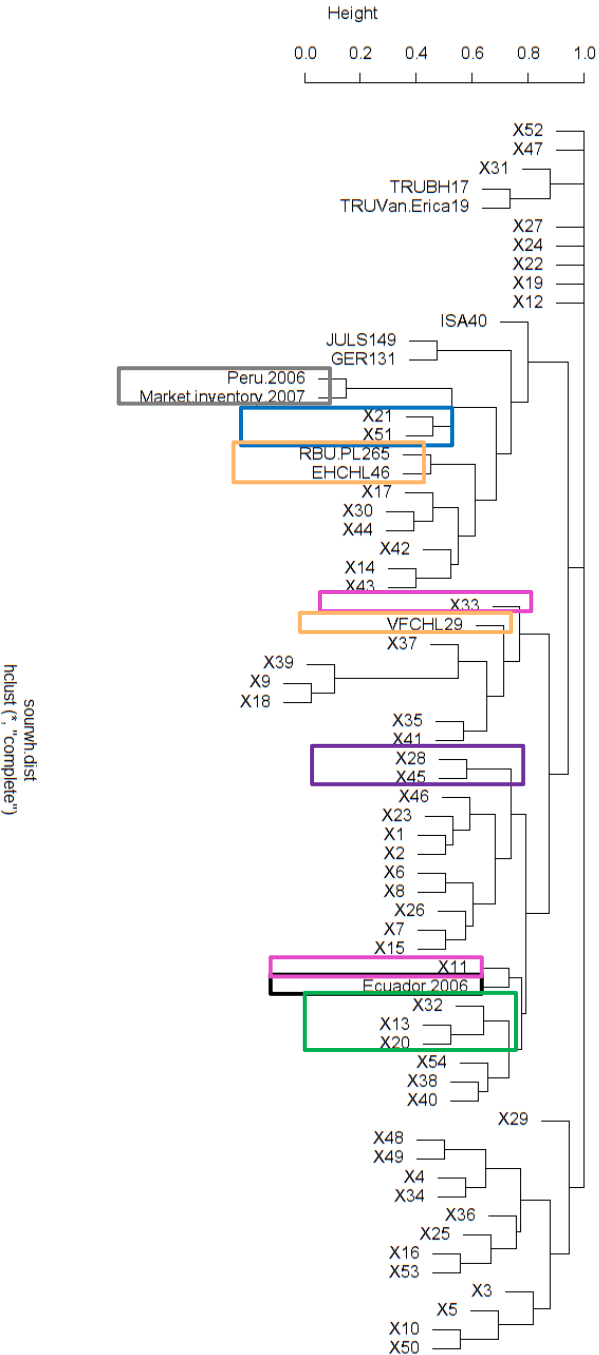
Cluster Dendrogram

sourv.dist
hclust (*, "complete")

Tree Dendrogram

- Dendrograms are read according to the height scale on the left
- That axis is actually a measure of distance.
- Distance can be between “0” distance meaning having everything in common, or complete distance (which on here means a completely separate branch).



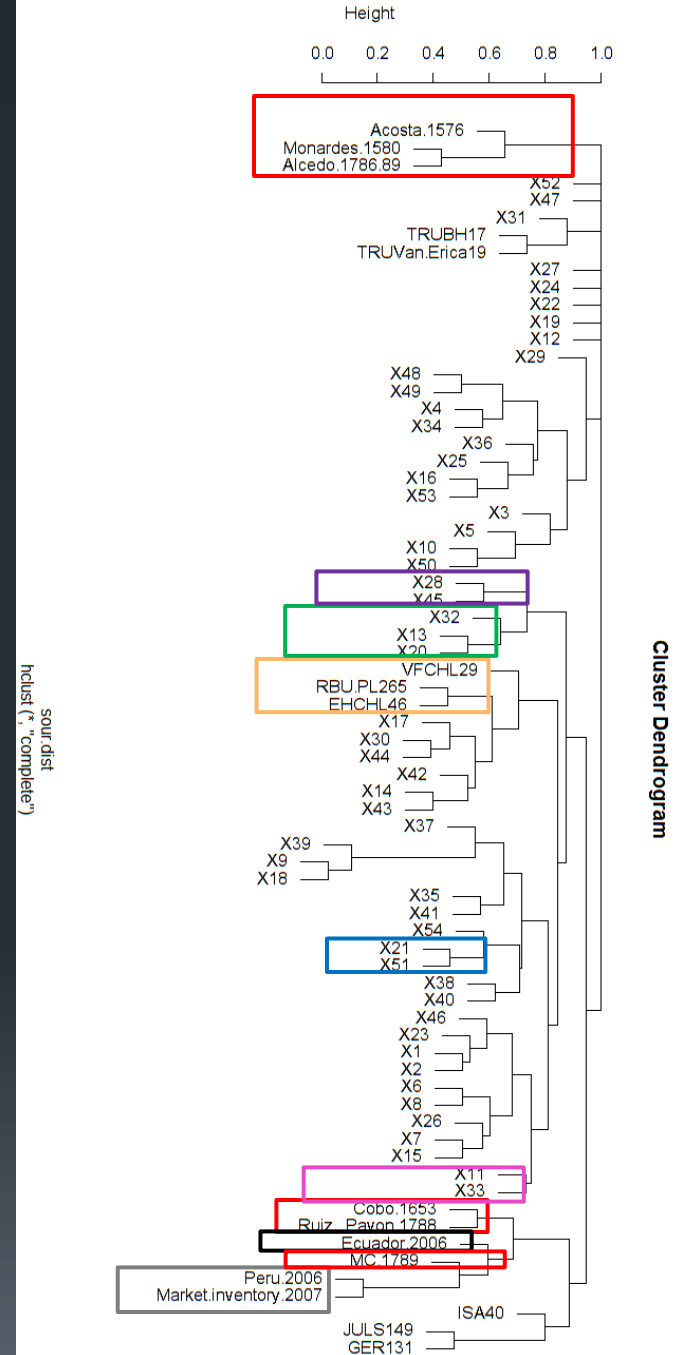


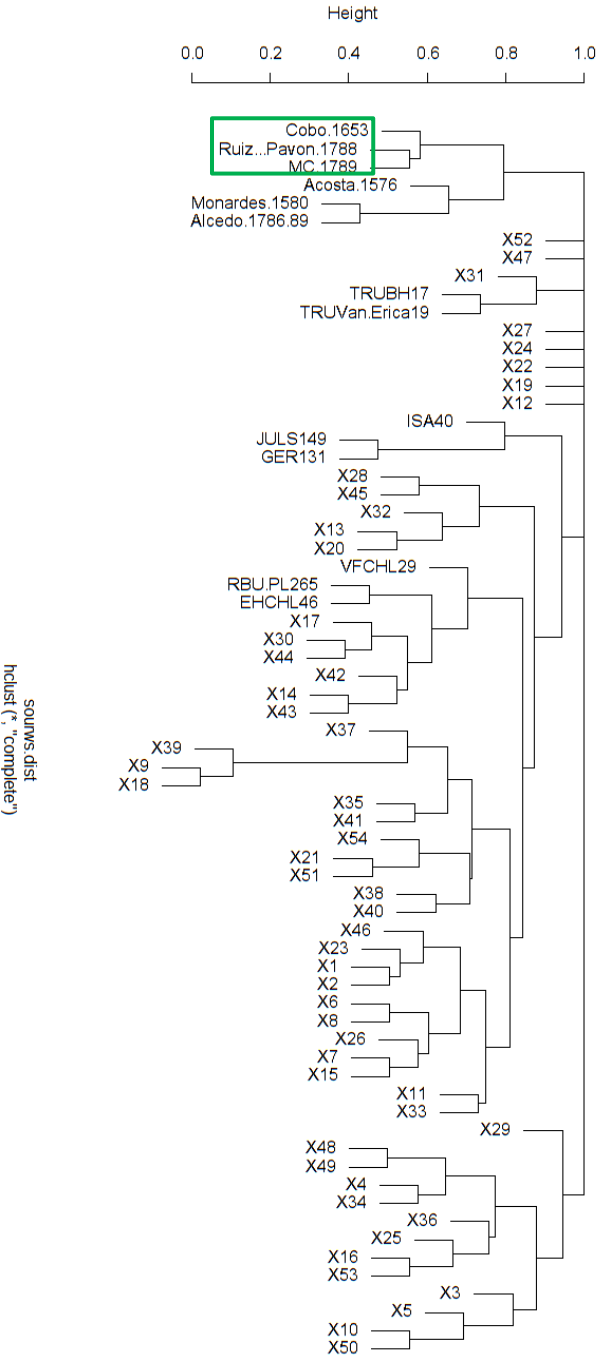
Market Results

To the right shows how market vendors, healers, surveys, and historical sources cluster

On the left and right colors mark the resulting changes from them being removed.

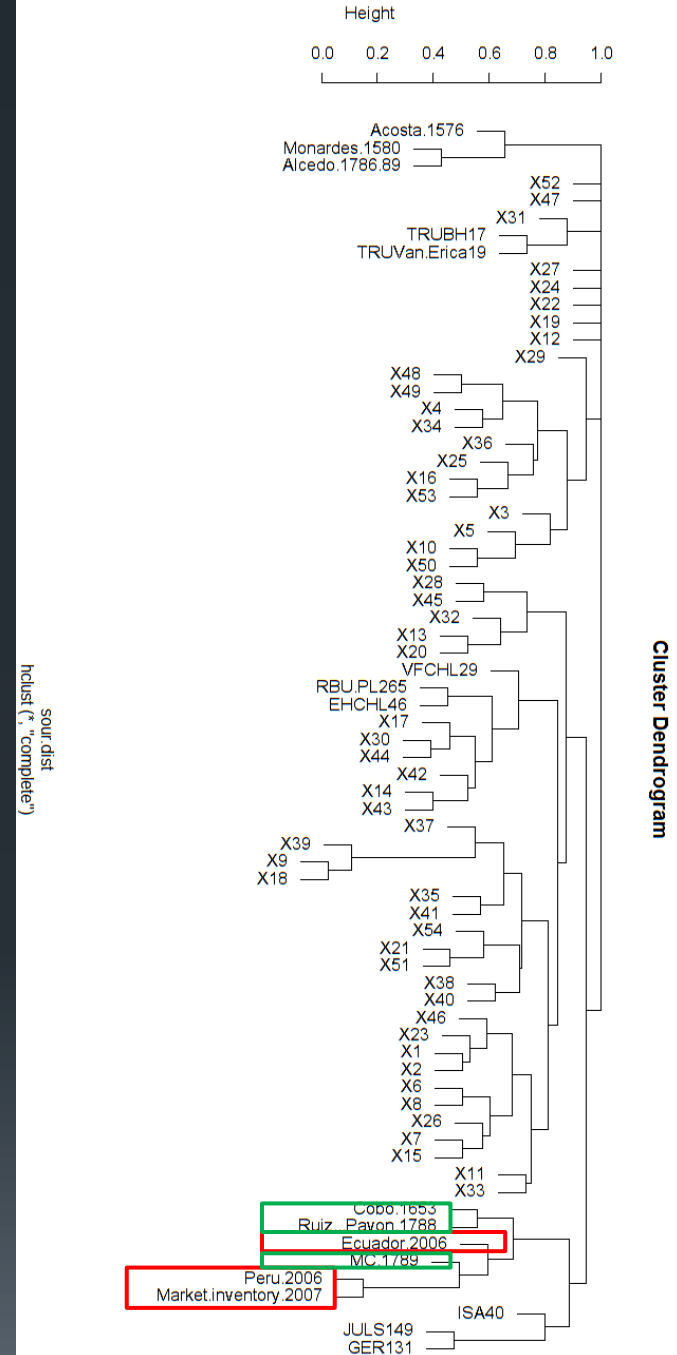
What does this all imply about historical sources

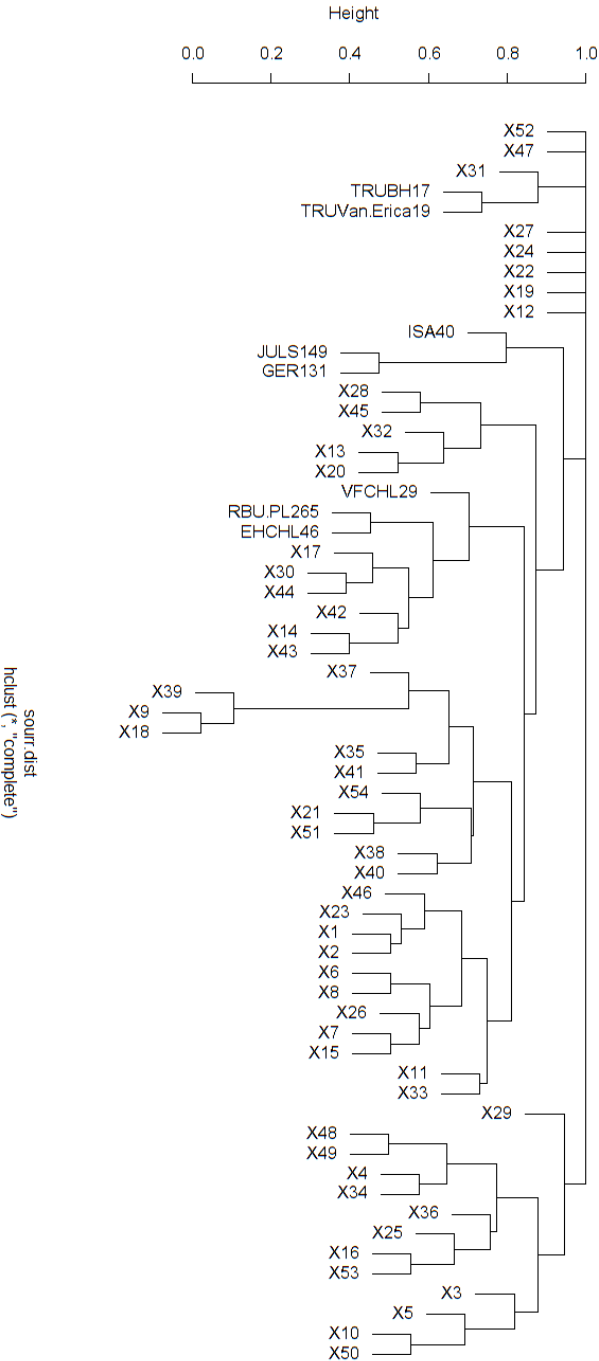




Except for the deletions and historical sources clustering together, there are zero things that changed!

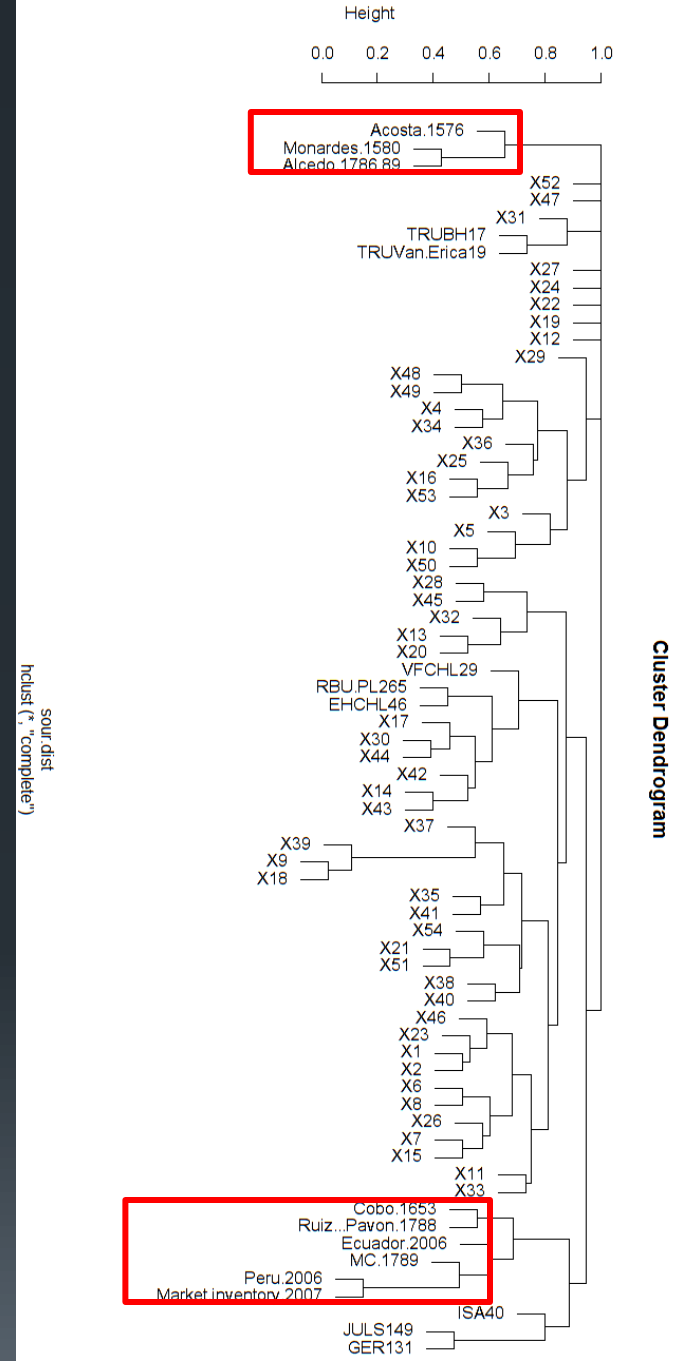
So What does this mean?

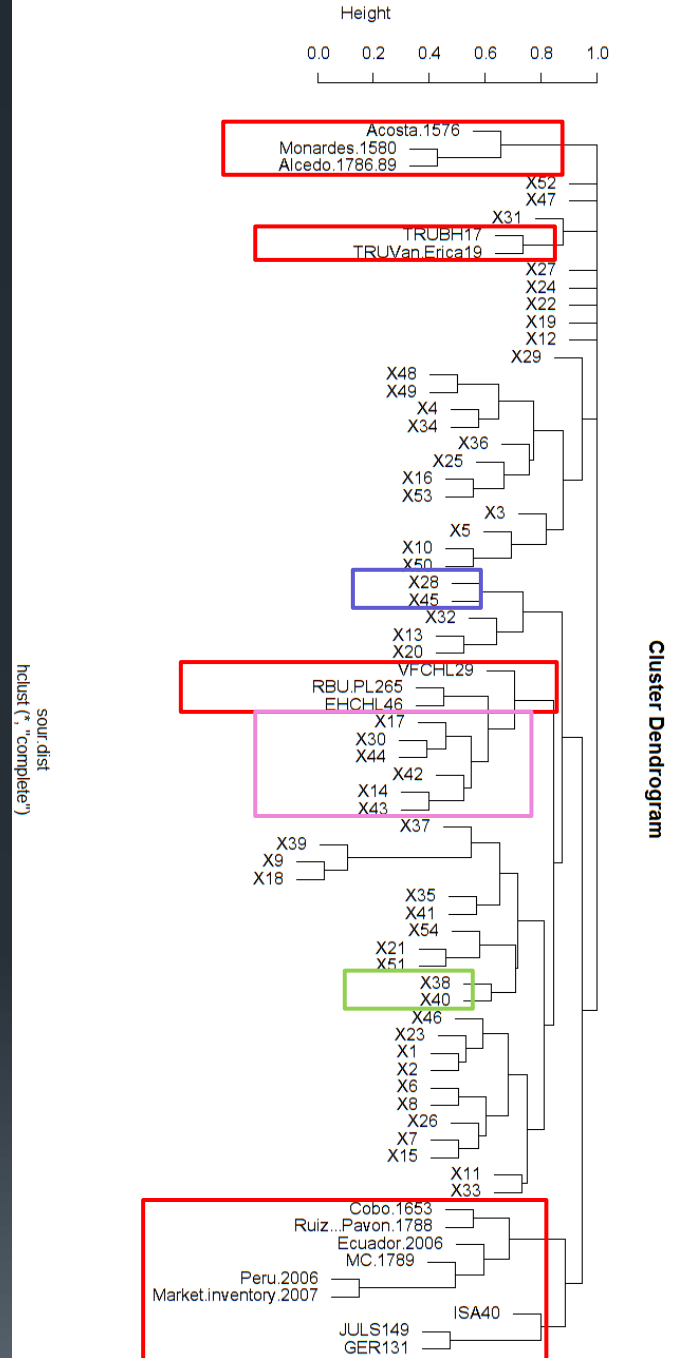
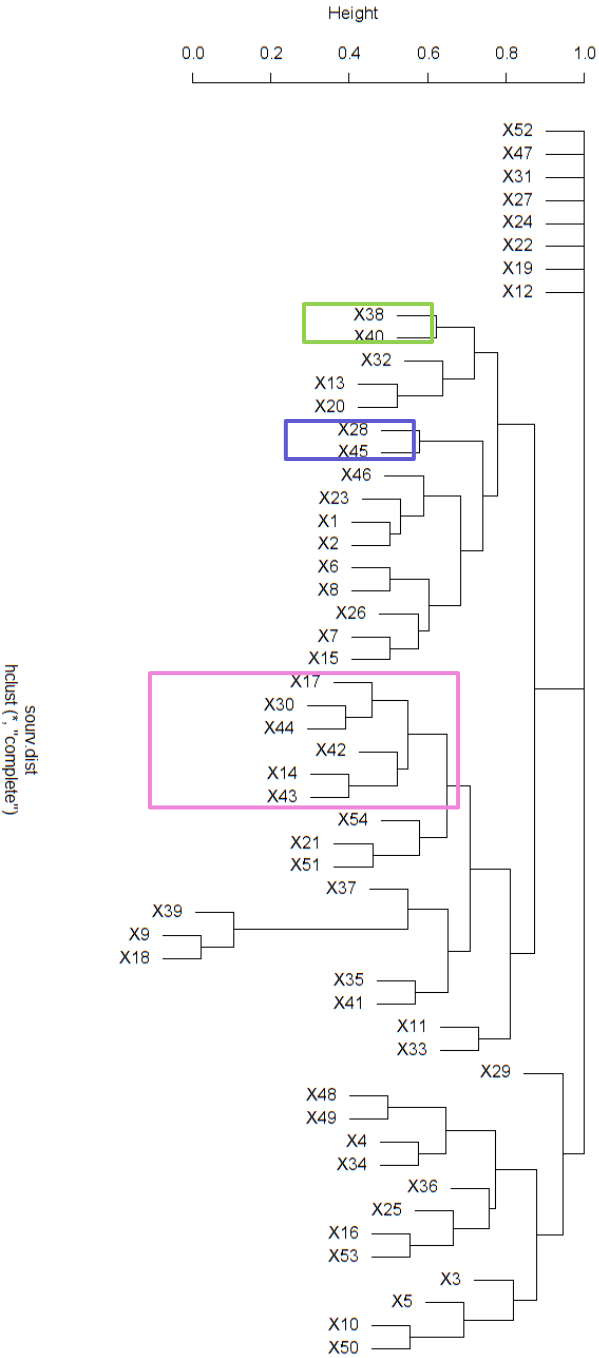




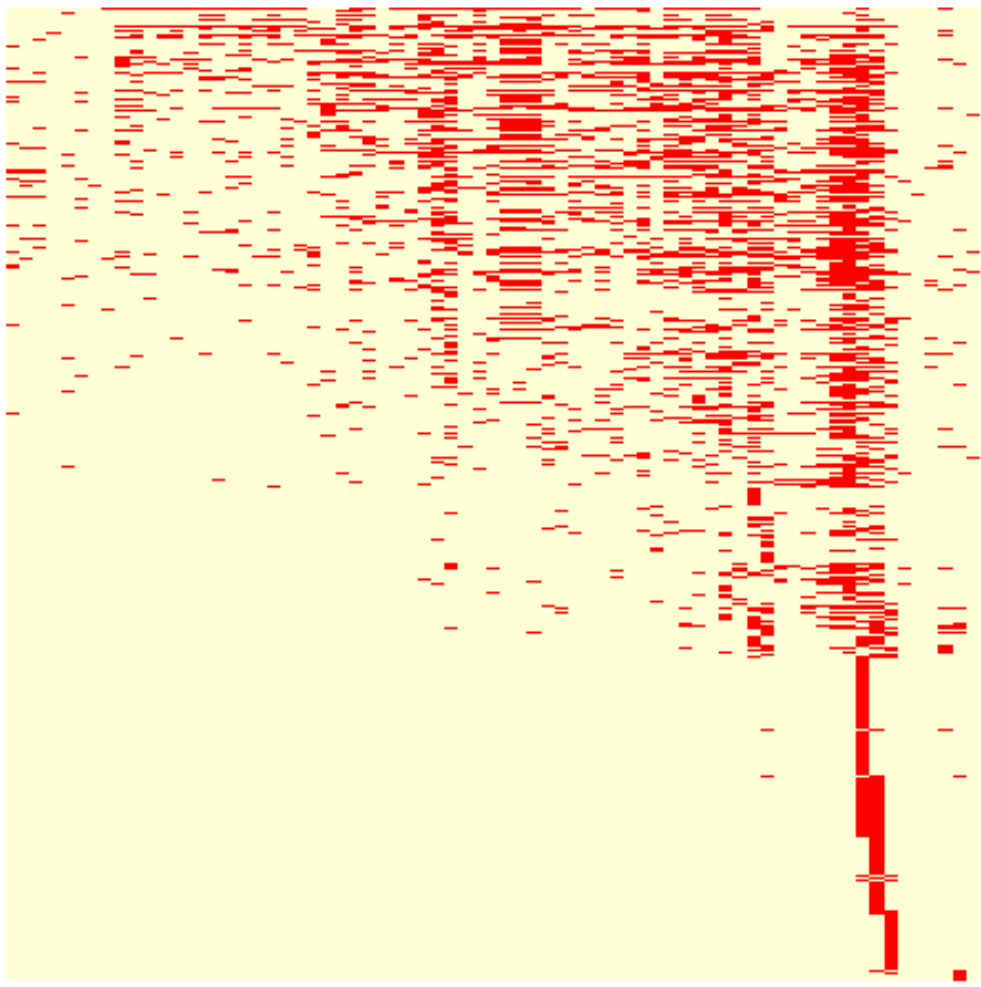
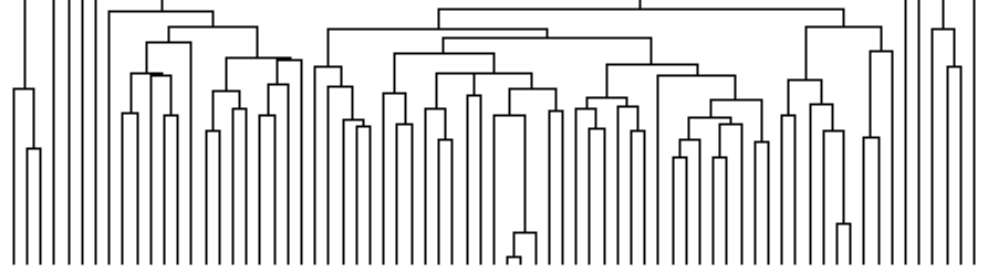
No changes
occurred

Why would
removing historical
sources cause so
much change
before but zero
change now that
surveys have been
removed too?





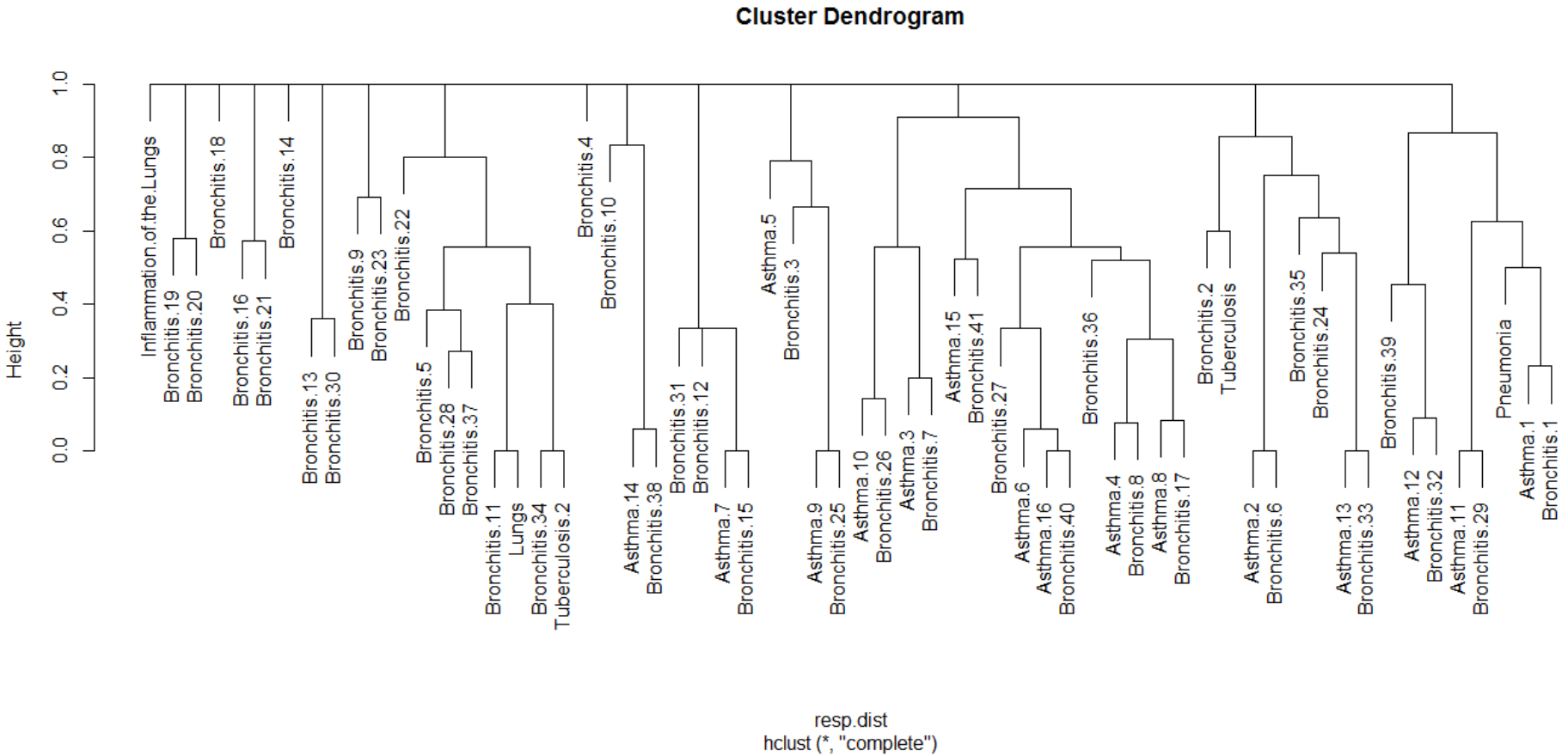
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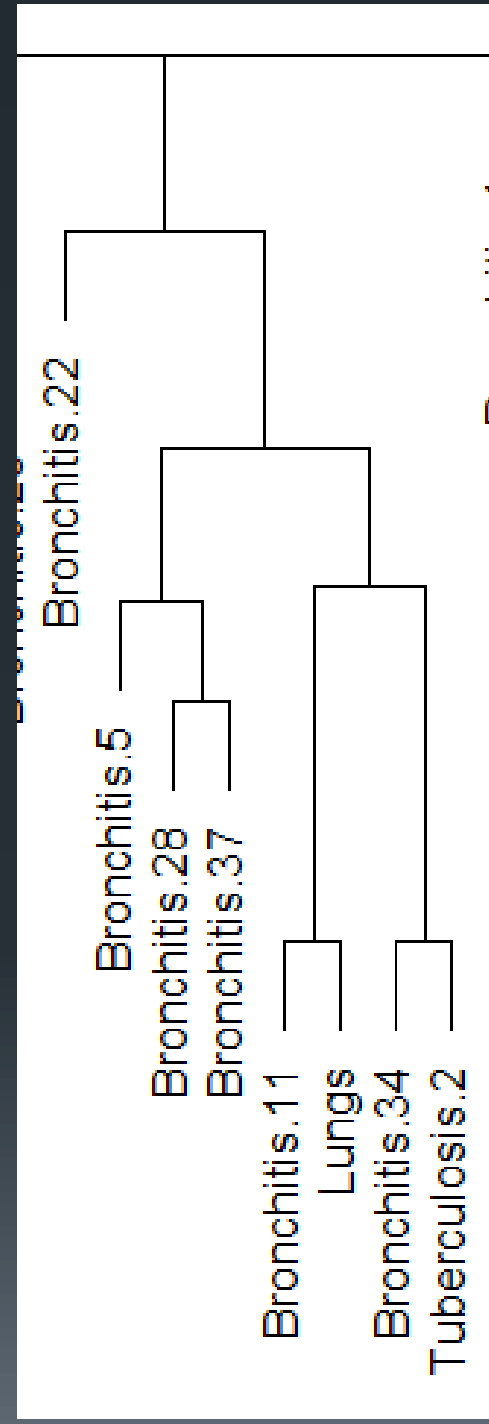
Plant Species



Respiratory Results



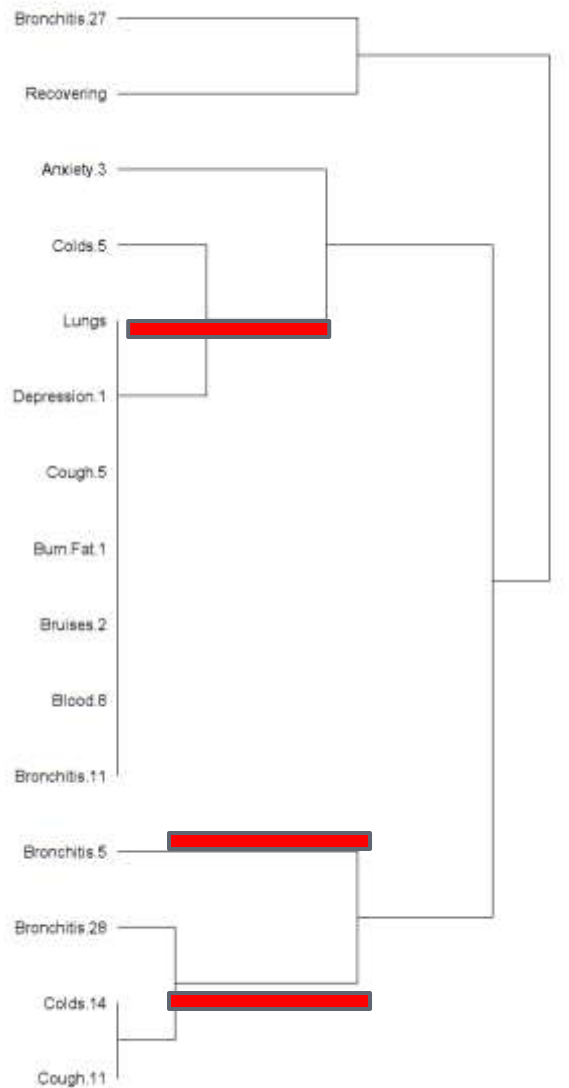
- This clade contains many asteraceae and is likely analgesic, aka a painkiller mixtures



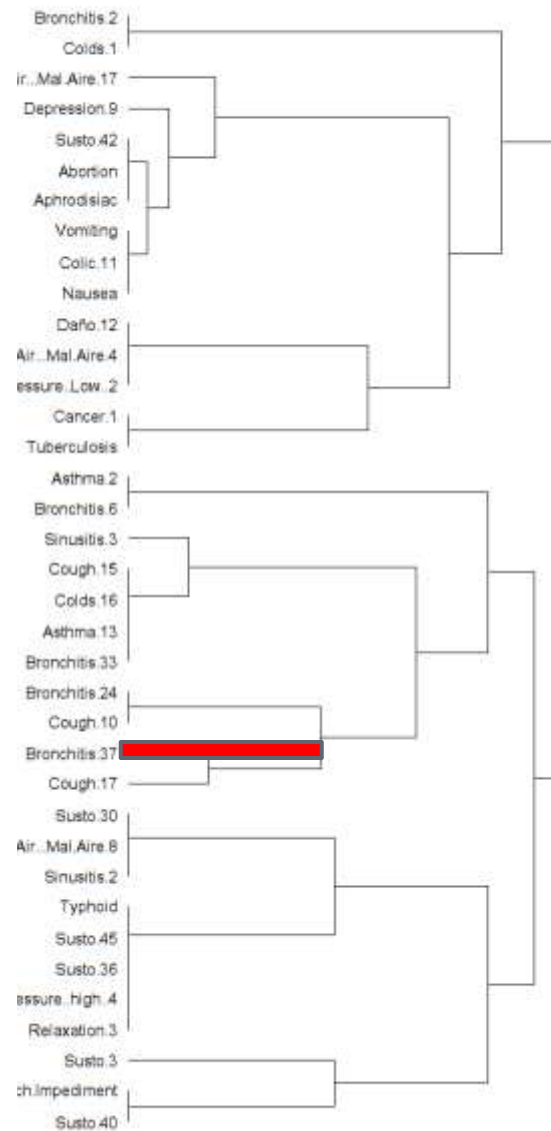
0.0 0.2 0.4 0.6 0.8



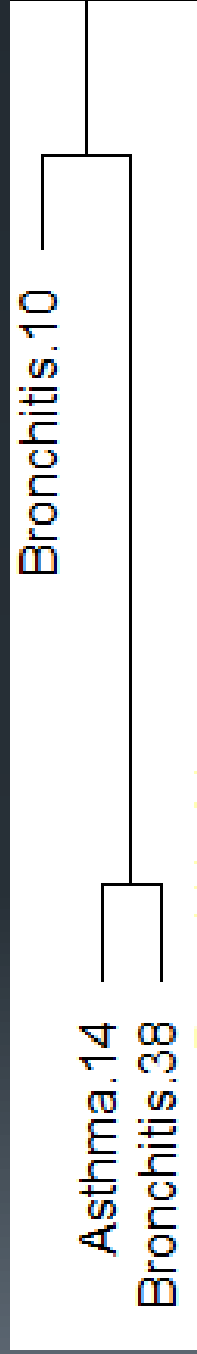
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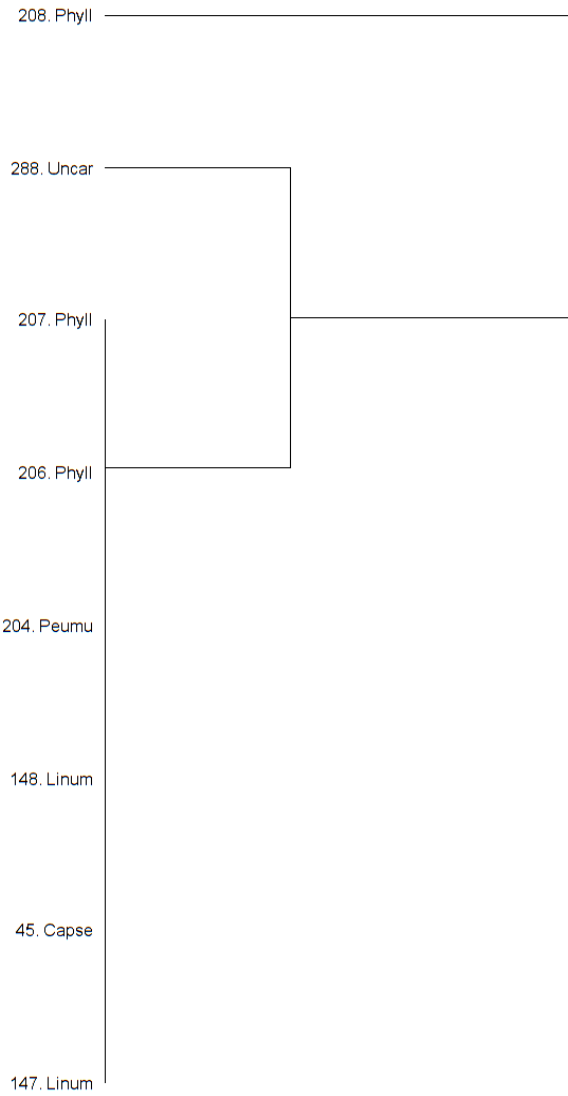
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- This little branch alone has a very interesting plant mixture
- This branch has a mixture with diuretics (promote urine flow), anti-inflammatories, and antibacterial



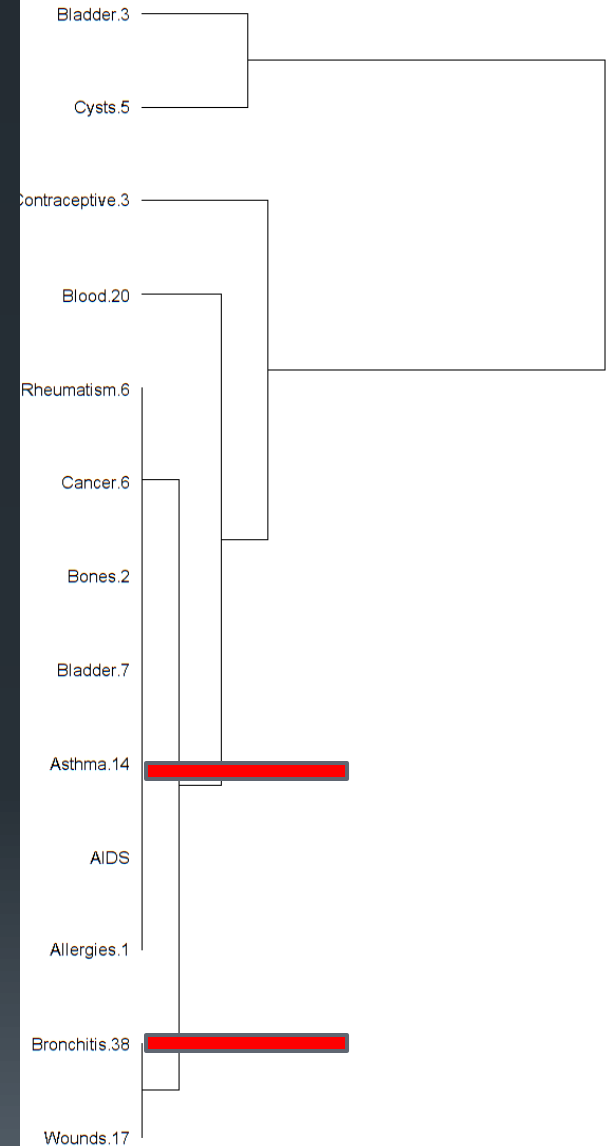
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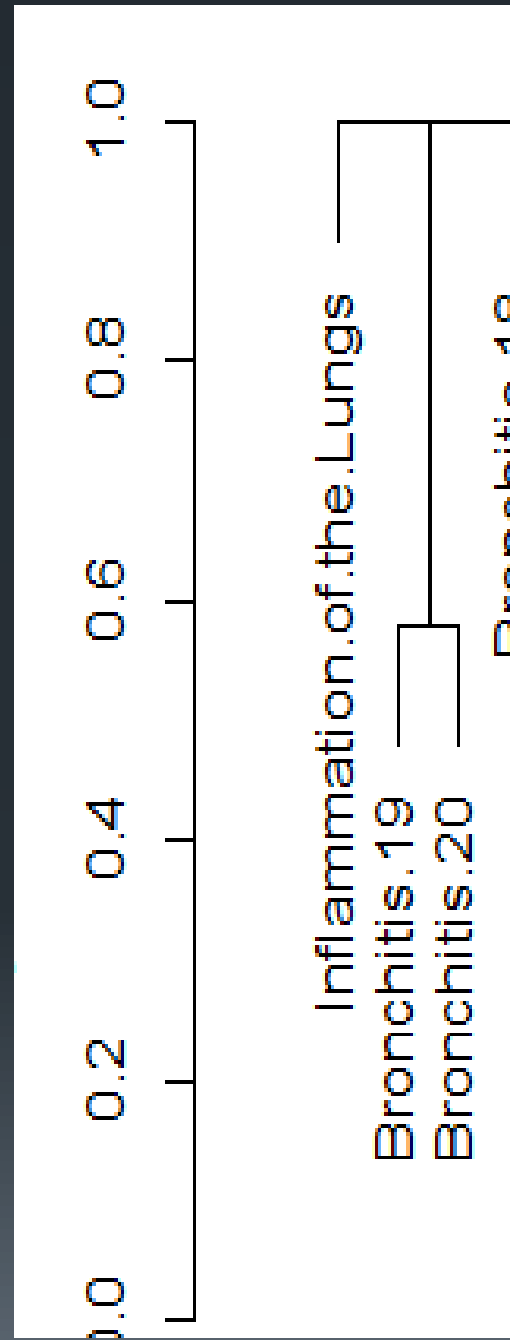
To the right are other illnesses that the previous mention asthma and bronchitis clusters with

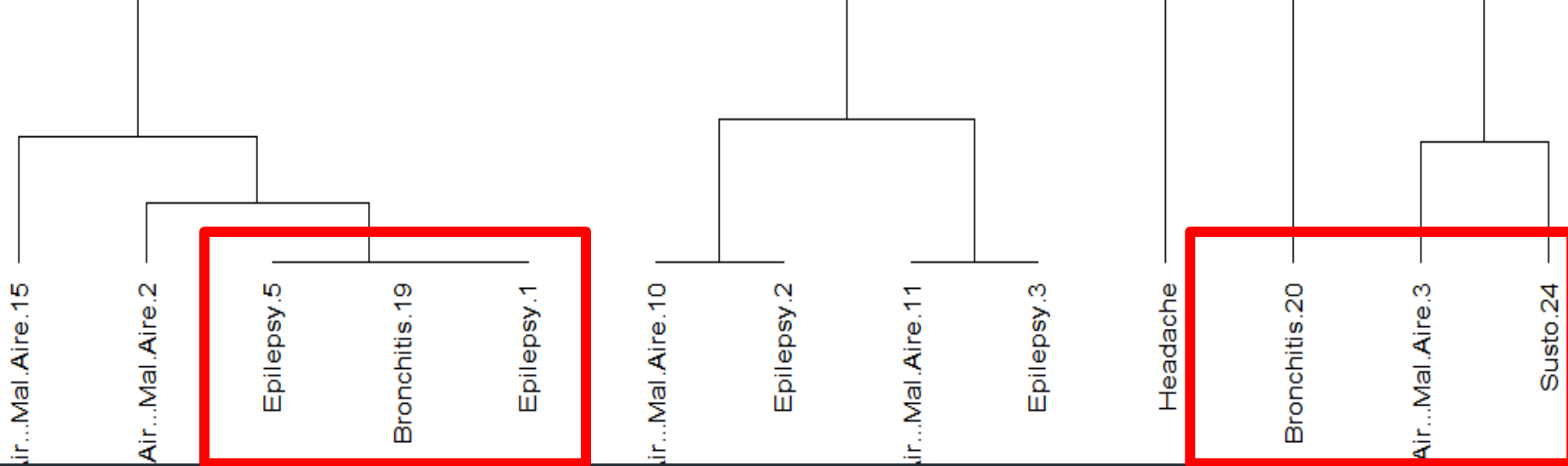
To the left there's the plant mixture responsible.
Linum sativum – anti-inflammatory and diuretic
Peumus boldus – anti-inflammatory and antibacterial

0.0 0.2 0.4 0.6



- Focus is on bronchitis 19 and bronchitis 20
- Nothing very interesting about their clustering together until you look at the how they cluster with other mixtures

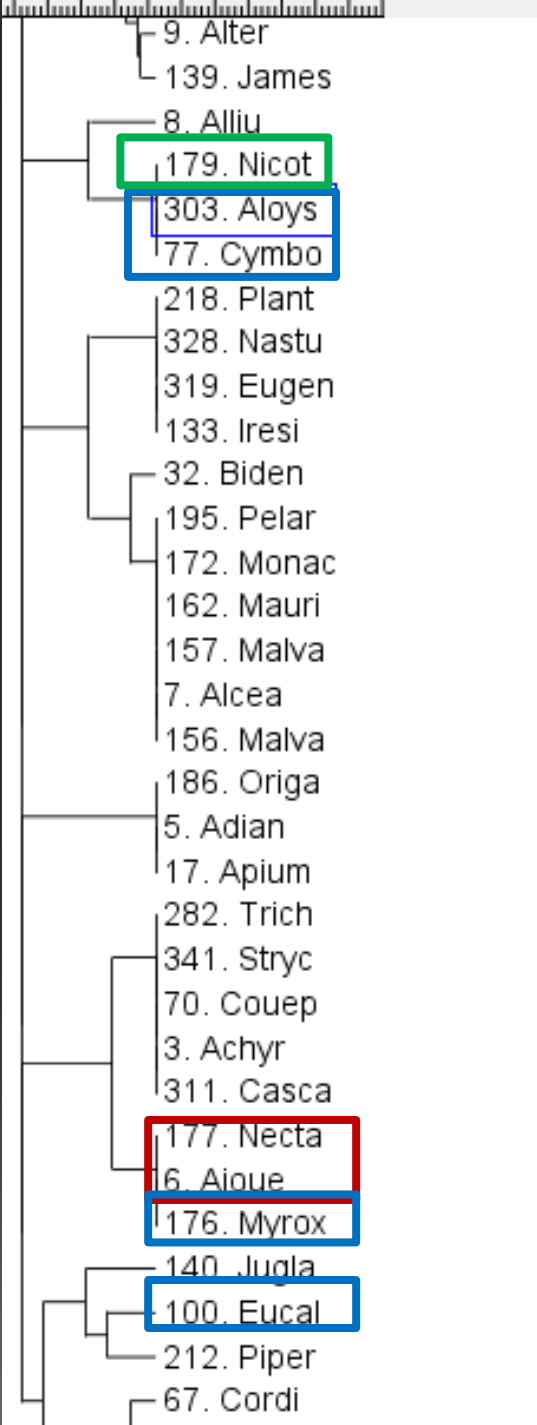




Bronchitis 19 clusters with Epilepsy????

Bronchitis 20 clusters with Mal Aire and Fear(Susto)???

Why???



- Plants on the left, highlighted red are plants that are psychotropic
- Plants highlighted blue are neuroactive

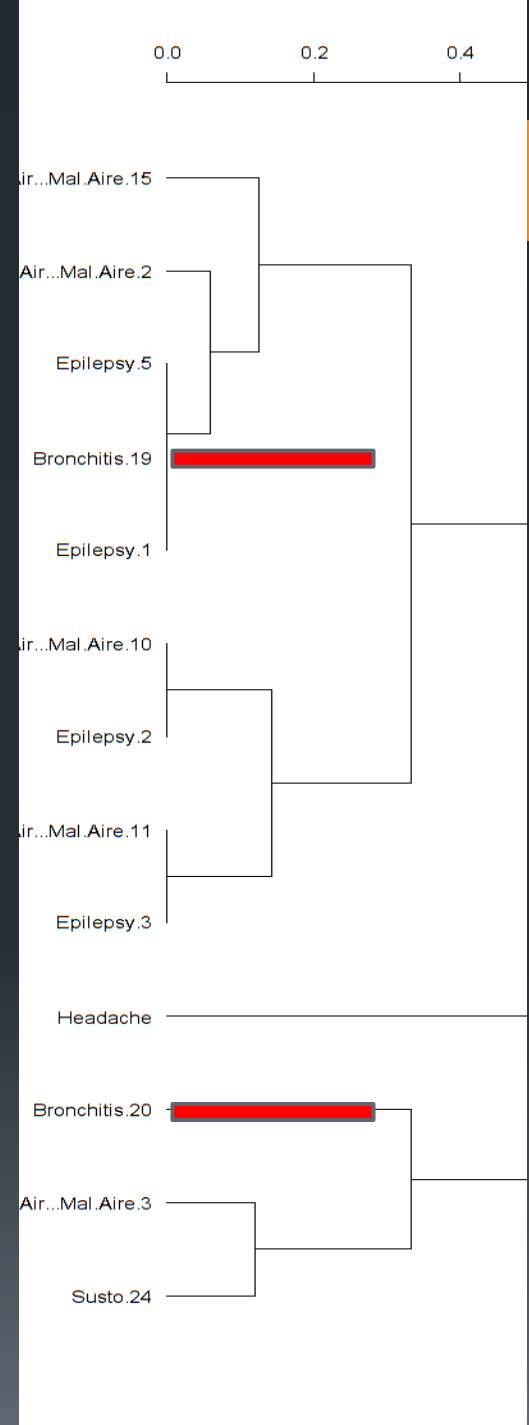


Eucalyptus globulus

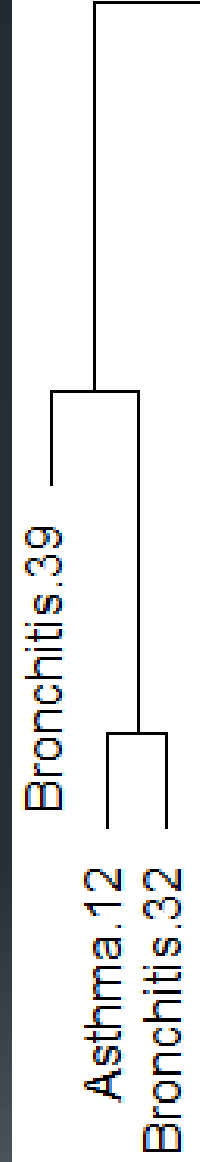
The plant, green highlighted, *Nicotiana tabacum*, relieves cramps. So essentially a muscle relaxer. Good for constricting bronchioles that prevent breathing



Nicotiana tabacum

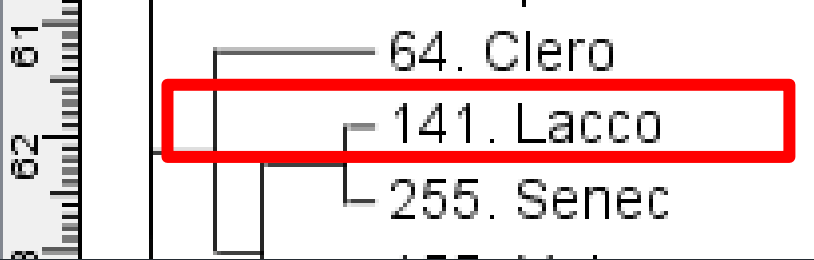


- This clade, to me, was also very surprising. Once again we look at the mixtures dendrogram to see why

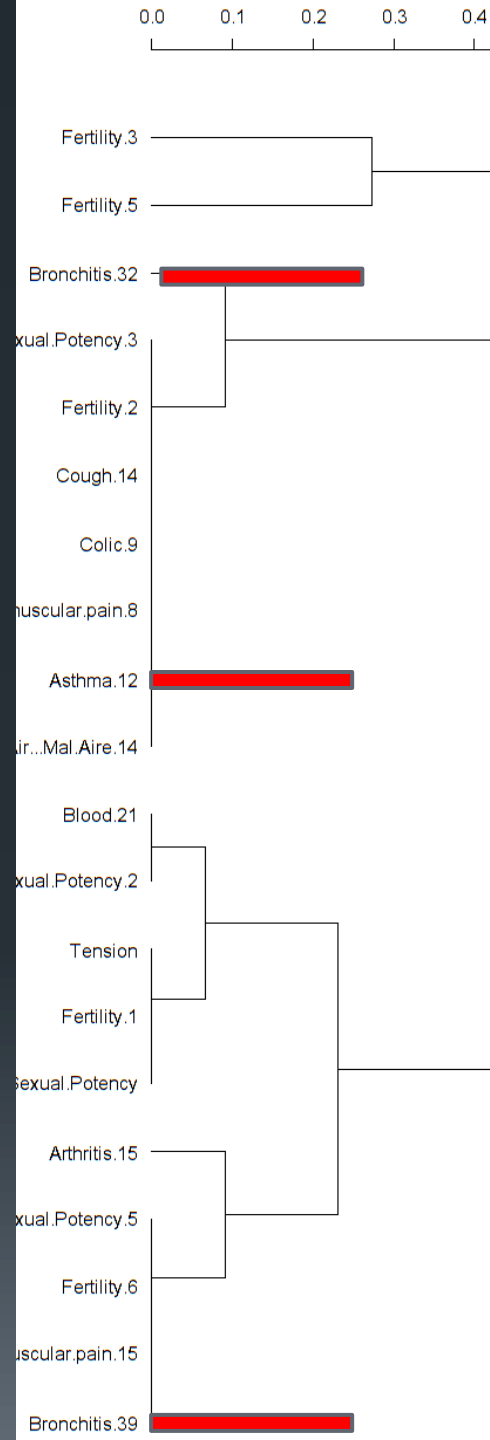




Bronchitis and asthma clustering with sexual potency and fertility

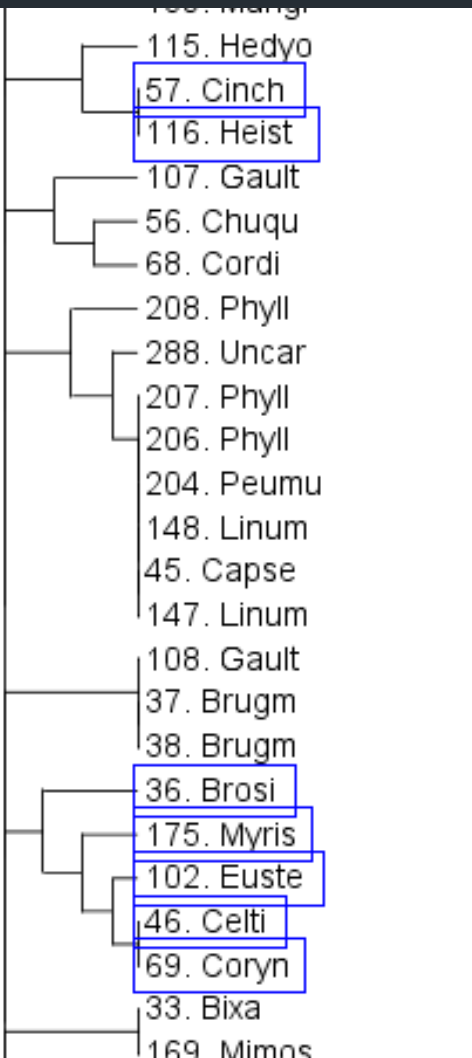


Laccopetalum giganteum



In the image above, the highlighted *Laccopetalum giganteum* is highly anti-inflammatory and is mostly responsible for the treatment of respiratory diseases

These others highlighted on the left, mixed with the laccopetalum help fertility and sexual potency.



Cinchona officinalis



Brosimum rubscens

Conclusion

- Had to answer two questions.
- Past v present
 - Can conclude that compared to historical data much plant knowledge has been gained and much of it lost too many but a select few.
- How is respiratory treated
 - As would expect with experimentation many treatments
 - Treatment largely dependent on how they determine the cause
 - Treatments rarely specific to body parts or illnesses. Rather general.
- A lot of value in this type of study
- Great for this type of comparative study
- In terms of ethno botany
 - Not just surveying what's used, for what, and how
- Gives some more in depth analysis to see people in plants relationship on a more specific level such why it's used for what, who knows how to use it for what, where its used, and more.

Acknowledgements

- Nation Science Foundation (NSF)
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- Missouri Botanical Garden (MBG)
- William L. Brown Center (WLBC)
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- Jessica Griffard
- Alyse Kuhlman
- Robbie Hart
- Andrew Townesmith
- Eric Feltz
- My fellow students of the NSF Research Experience for Undergraduates Program.

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