



quassan for sawfly

Posted by [Michael Phillips](#)

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[Michael Phillips](#)

[quassan for sawfly](#)

March 14, 2013 03:58PM

Moderator

Registered: 11 years ago

Posts: 621

One of the project areas being looked at by the Research Committee is the use of quassan to deal with high rates of European Apple Sawfly infestation. Quassan (the active ingredient found in the wood of the quassia tree) is commonly used in organic orchards in Europe to deal with EAS at the first instar stage. A paper posted in the [HON Library: European Apple Sawfly](#) will bring you up to speed here. Growers throughout the northeast have this pest on their radar for sure.

We have a choice of importing the dry quassan powder from a German supplier, a liquid quassan formulation from a Swiss supplier, and/or simply ordering quassia wood from an herb supplier. The first two are "standardized" in that the percent active ingredient is known. That's good to know when striving to do legitimate research. On the other hand, the availability of the actual herb with which to make a straightforward decoction seems far more practical.

Quassia is indigenous to Brazil, Peru, Venezuela, Suriname, Colombia, Argentina, and Guyana. The herb is extremely bitter; its one name *amargo* means "bitter" in Spanish. These small deciduous trees are noted for never being bothered by insect pests. This is due to a component in the resin called quassin, which has long been used by West Indies farmers as a botanical insecticide. Herbalists use a quassia extract primarily as a digestive aid and to treat liver and gallbladder problems. A beer brewer can use quassia as a substitute for hops.

Quassin is considered to be significantly more effective on the first instar stage of EAS because of "scratch ingestion" as the tiny larvae feed across the skin of a first fruitlet. The second instar stage penetrates a next fruitlet to consume the developing seeds. Unstopped, sawfly goes on from there to more fruitlets. You get the idea. The larger larvae hardly stop to ingest the treated surface ... thus application timing needs to be right tight to petal fall to gain an upper hand. Making such a "bitter spray" more systemic by means of fermented garlic extract might be the ticket to improve efficacy on the second instar.

[Lost Nation Orchard](#)

Zone 4b in New Hampshire

Edited 2 time(s). Last edit at 04/04/2013 02:06AM by Michael Phillips.

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[David Maxwell](#)

[Help! I need a statistician.](#)

August 04, 2014 10:22PM

Registered: 11 years ago

Posts: 197

I now have 4 years' worth of data on the effectiveness of Quassia in controlling EAS. Eyeballing my results it is apparent that Quassia extract is effective. But I need to establish that this is not due to chance. I think that what

I need is a t-test of the difference of the means, (ie null hypothesis that the mean damage of the control and treated trees are the same.) But I am hung up on how to deal with small sample numbers of some observations, ie. the standard deviations of different observations will vary widely, and hence may not be amenable to legitimate combination. I don't really expect that any of our merry band of amateur researchers will hold the skills needed to advise me, but just in case, does anybody out there feel able to advise me on statistical methods?

[Broomholm Orchard](#)

Zone 5b in Nova Scotia

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[David Maxwell](#)

[Re: quassan for sawfly](#)

March 14, 2015 02:28AM

Registered: 11 years ago

Posts: 197

I have reached a bit of an impasse with this, and would welcome any and all comments, suggestions or expressions of interest. Here is where I stand: I started 4 years ago, spraying one of each paired cultivar in my very small orchard (of multiple cultivars) with a commercial Quassia extract (from Germany), brought in after massive paperwork, as a formal research project. That first year I was working with a scientist from a government research station. For reasons I have never been able to determine, she dumped me unceremoniously after that first year, and will no longer even return attempted communications. Since then I have carried on, using a dwindling supply of my German extract to repeat the experiment - spraying half the trees with Quassia, and leaving the other matching

cultivar unsprayed as a control. Now, if you have followed me to this point, you will appreciate that my sample sizes are awfully small - generally one pair of trees of each cultivar. My fellow researcher was using a block of a single cultivar, with multiple instances of sprayed and control trees. In simple terms, we both demonstrated that Quassia amara extract is very effective in controlling European Apple Sawfly, reducing damage from as much as 50% down to 3% or less. But my own trials, while flawed by very small samples, have a positive aspect: it is apparent that different cultivars vary markedly in susceptibility to EAS attack, (ranging from almost complete resistance to up to 50%)

Now, I suspect that one of the causes of my partner losing interest had to do with the issue of registration of pesticides. She took a request to the government agency which approves so-called "minor use" products - products which are permitted to be used despite their not having being subject to a full formal application for registration. It was turned down. So there is no legal means to import and/or use Quassia extract, at least in Canada. Nor is it formally registered in Europe. The difference between Europe and Canada is that in Europe the organic certification folk permit growers to use products other than those which are formally registered, without losing their organic certification, and the government food protection folk agree not to interfere as long as the organic certifiers are satisfied. In Canada, it is the other way around - the Pest Management Regulatory Agency has primacy, and the organic folk prohibit anything which is not approved by them first.

It is apparent that I am not going to get anywhere in trying to gain approval in Canada for the commercial extracts. And I suspect that the same situation will apply in the States. BUT, there is another avenue - bring in the raw wood chips, and brew one's own "Quassia tea" on farm. I put this to the organic certification folk, and they responded that they did not know how to answer. I pointed out to them that they had no problem with compost tea and/or nettle tea, and that a tea made from Quassia wood chips is arguably no different. Their first reaction was that Quassia is not on the list of approved materials. (Compost tea actually is officially listed; nettle tea is not) I then found the following "permitted" use:

"Substances that protect plants from harsh environmental conditions such as frost and sunburn, infection, the buildup of dirt on leaf surfaces, or **injury by a pest**. Natural substances are allowed, including but not limited to calcium carbonate, diatomaceous earth, kaolin clay, pine oil, pine resin and yucca." (Bold my own emphasis) (Parenthetically, neem oil is not registered in Canada, and for the most part the organic certification folk have refused to permit its use under their standards, "because it isn't on the list".)

This is when they got spooked and stopped responding to me, yea or nay. But they have said they will think about it, and get back to me. (That was 2 years ago.)

I figured I had beaten down their resistance, at least enough that they could not pull rank and block my access on the basis of "importation of an unregistered pesticide". But then I ran up against Border Services regulations, which, in essence, forbid the importation of any and all woods, bark, or other plant products unless explicitly listed in a list of permitted materials, (which, of course, does not include Quassia amara specifically).

With this impossibly long preamble, let me lay out what I want to do next:

1) I do think that my sample size is too small to make terribly valid conclusions. So if I can enlist a few intrepid growers with more trees willing to replicate my experiments, it would be well worthwhile. (Note that this involves leaving some trees unsprayed, with the sacrifice of some portion of the crop to the varmints (EAS). But if you are currently sacrificing all your trees to the EAS, saving half of them from damage is still a lot better.)

2) I do not think trying to get prepared extract brought in is a viable course. But farm-prepared extracts may well be a feasible plan. My sense is that the Canadian bureaucracy may be insurmountable, but, as Michael notes, there is a firm in Miami which is currently importing bark chips into the States already. If anybody is inspired to collaborate with me, I would suggest that we organise a purchase of bark chips from this vendor, (who will have already worked through all bureaucratic import hurdles), and do a full-scale trial with home-made extract.

3) My sense is that I have run up against a confounding variable - different cultivars have markedly different susceptibilities to attack by EAS, (unexplained by location in the orchard, time of bloom, or any other variable I could think of). I think, from the viewpoint of Quassia vs. EAS, the only option is to stick to what amounts to 20 or 30 individual experiments, treating each pair of trees as individual trials, (or, in a few instances, small groups of 2 or 3 trees, where I have more than 2 trees of a given cultivar.) But this also raises a completely different research question: Is this inter-cultivar susceptibility a general phenomenon? This harkens back to Michael's current project (if I have correctly interpreted it - it is a little unclear from his brief message just what he is up to) - susceptibility of different cultivars to CAR. And there is no particular reason why I couldn't piggyback on Michael's collaborations if others are willing - monitor and record which cultivars are susceptible and which resistant to CAR. And at the same time document the extent of attack by EAS.

Michael quite appropriately is looking for others to drive their own individual projects. And I am very much willing to take charge of both of the above projects - effectiveness of Quassia against EAS, and natural resistance of different cultivars to EAS. All I need is willing collaborators. So if any of you are moved to work with me on pursuing either (or both!) of these efforts, I would strongly urge you to send me a message, and we will get on it right away.

[Broomholm Orchard](#)

Zone 5b in Nova Scotia

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[Mike Biltonen](#)

Registered: 10 years ago
Posts: 298

[Re: quassan for sawfly](#)

May 06, 2015 01:51AM

David, we covered some ground a few years ago on this and I dropped the ball. Apologies! I am very interested on many levels with the use of Quassia for EAS control. It is too late this year for my collaboration (all of my growers' trees are heading into full bloom) but I would love to establish some state-side research projects for 2016 looking at exactly what you've asked: the varietal susceptibility.

One thing I could find out if I had time to read, but I don't, so I'll ask is: does anybody 1) understand the attraction (e.g., specific volatile compounds) of certain cultivars or 2) the active compound in Quassia that is so effective? Couldn't we grow it here? Is there a surrogate plant with a similar compound?

Mike

[Mike Biltonen, Know Your Roots](#)

Zone 5b in New York

[Reply Quote](#)

[David Maxwell](#)

[Re: quassan for sawfly](#)

May 06, 2015 03:36PM

Registered: 11 years ago

Posts: 197

In answer to question 1, yes, there is research on the specific volatile compounds which both attract specific pests and actually repel others, and I have a couple of papers in the jumble on my desk, which I couldn't immediately lay my hands on, but would be happy to track down if you really want to know. (Having found this information awhile ago, I wasn't entirely sure what it meant in practical terms.)

Question #2 This one is much clearer, as Jutte Kienzle explicitly studied it. The ingredient which is most toxic to the EAS is quassin, with a lesser effect of neoquassin. (I can give you the chemical structures of both of these if you want, but they are basically simple cyclic molecules. Methods of synthesizing them have been published, (but nobody has expressed an interest in doing so commercially). Indeed it was Kienzle's research which led to the standardisation of the concentration of quassin in the commercial preparations, as some growers brewing their own quassia extract were not getting good control. Kienzle showed that the concentration of quassin in these extracts was low. She went on to test varying concentrations of quassin, and determined that a minimum of 5 (I forget the units) per square metre of tree canopy was necessary. (I can post the proper, accurate details if anybody is really interested. It just requires my going back into my files. But I am dashing this off in some haste, with just the essence of the thing.)

[Broomholm Orchard](#)

Zone 5b in Nova Scotia

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[Carol Gudz](#)

[Re: quassan for sawfly](#)

May 29, 2023 09:46PM

Registered: 1 year ago

Posts: 21

Here is a link to a study on using quassia wood decoction on Apple sawfly. The study found it to be effective.

[\[hortsci.agriculturejournals.cz\]](#)

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[David Maxwell](#)

[Re: quassan for sawfly](#)

May 30, 2023 02:23AM

Registered: 11 years ago

Posts: 197

Yes, I was aware of this publication. A gentleman by the name of Neupane did a similar study in Sweden (or was it Denmark?) as his Master's project, and got similar results. (He was actually Tibetan, I believe, and went back to Tibet at the end of this project, and I was unsuccessful in tracking him down to find out how he made his quassia extract.)

Charles Vincent, a Canadian scientist with Ag Canada, explored the use of a parasitoid, *Lathrolestes ensator*, back in the early 2000's, (concluding that it worked to eliminate a majority of the EAS, but not enough to reduce the damage to the apples, because the remaining EAS still destroyed a significant percentage.) He obviously remained interested, as I have recently found a paper he published in 2019, with an exhaustive review of everything to do with EAS, (5 pages of references!):

[\[www.bulletinofinsectology.org\]](#)

I am satisfied that quassia is effective in control of EAS. I think that Vincent put his finger on the observation I made in the past about differences in susceptibility of different cultivars - I think it probably has to do with differences in time of bloom, with a very tight time of emergence of the EAS adults from diapause. But I need more trees than I have, and more repetitions, (over several years), to prove this. And when we explored all these topics 7 years ago, nobody was interested in collaborating on a study.

In the meantime, I am continuing to use quassia extract as a control, and actually sprayed my trees this morning, before seeing Carol's message.

[Broomholm Orchard](#)

Zone 5b in Nova Scotia

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[Carol Gudz](#)

[Re: quassan for sawfly](#)

June 12, 2023 05:38AM

Registered: 1 year ago

Posts: 21

David do you have an actual extract? If so do you have a shareable source?

I have been using quassia powder that I purchased online.

There seemed to be some questions about the solubility of the active compounds in Quassia (the study I referenced found that a decoction was effective (which normally involves essentially boiling the organic matter in water for a period of time -say 20 minutes). This suggests that the key compounds in Quassia are soluble in water.

However, I did not see this study before starting my preparations. Sooo, here are the steps I took:

- 1) I soaked the (1 pound) of quassia powder overnight in enough alcohol to thoroughly wet it (maybe 4 cups?). Kind of a lot of alcohol to use for this- I wouldn't do that step again.
- 2) The next morning I strained the Quassia powder out of the alcohol (which presumably contains any Quassia compounds that are soluble in alcohol). I kept both the alcohol and the strained Quassia powder.
- 3) I then decocted the reserved Quassia powder (boiled it in water for about 20 minutes). Then I again strained out the Quassia powder. I disposed of the Quassia powder at this point and just kept the water which should contain any Quassia compounds that are soluble in boiling water.
- 4) I combined the Quassia "water" and "alcohol". This mixture theoretically should contain any Quassia compounds that were either soluble in water or alcohol. I heated the mixture for a few minutes to evaporate some alcohol (not sure if this was necessary or not).
- 5) I added this liquid to my regular spray.

When I read about amounts of Quassia to decoct, they typically talked about using something like 8 or 9 pounds of Quassia wood. Because I have no practical way of decocting this much, just worked with about a pound of Quassia powder. I have no info to share on the dosage (I only used 1/3 of the liquid and I don't remember whether or not I sprayed all of our fruiting plants or just the apples (15 semi-dwarf at various stages of maturity). If I sprayed all the other fruiting plants (pears, grapes, cherries, haskaps), it would be very dilute. have no idea whether or not this dosage is sufficient but I guess time will tell. If anyone has experience with the issue of dosage it would be great to hear from you.

[Reply Quote](#)

[David Maxwell](#)

[Re: quassan for sawfly](#)

June 12, 2023 09:48PM

Registered: 11 years ago

Posts: 197

Whatever you do to prepare your spray, the significant question is the amount of quassin, and to a lesser extent, the amount of neoquassin. Jutte Kienzle, I think, did the definitive research on this - you need at least 6 gm of quassin./ha/m. of tree height, and less than that concentration is less effective. Which obviously raises the issue of how does one know how much quassin there is in your brew. My sense is that, starting with Quassia amara wood, either as chips or ground powder, it is impossible for such as us to know the concentration.

Kienzle worked with a German manufacturer, Tri-folio-M, to create standardised extracts of Quassia, with measured concentrations of quassin, and I obtained my material from them, on a research licence, for use in *bona fide* research, (which I did legitimately do, and report). So I acquired 3or 4 foil wrapped packages of dry powder, which Tri-Folio had extracted from the raw wood, extracted, then dried to make a fine light brown powder which readily re-dissolves in plain water for spraying. There is a firm in Switzerland selling quassia extract in a liquid concentrate, and a rather enthusiastic Frenchman who contacted me to try to get me to purchase his product. All 3 of these have measured concentrations of quassin, and all 3 have issues in terms of importation over regulatory approval. (I think it may actually be less of a problem for you in the States than for me in Canada.) All 3 also will be charging for preparing the extract and standardising it.

So, this is what was behind the paper in HortSci you cited, (as well as the Tibetan gentleman in Sweden) - can one brew one's own extract, (at considerably lower cost, and considerably less bureaucratic obstruction).

I was trying to enlist folk to collaborate with me to research efficacy, but 7 years ago, there was no interest. I still have 2 pouches of quassia extract left over from the formal research project, and have been using them on my own trees. I would be both willing and able to set up a new experimental protocol, should people come forward to collaborate, and my sense is that my existing experimental licence would cover any issues of permissible importation and/or use.

But the window has closed for this year - you have to get the spray on at bloom. If you, **and** enough other folk with mixed orchards want to collaborate for next year, I would love to have another go at it, either using the commercial extract, (of which I still have substantial quantities), or the home-brewed version, or, (even better) a comparison of both, I am game.

[Broomholm Orchard](#)

Zone 5b in Nova Scotia

[Reply Quote](#)

[Carol Gudz](#)

[Re: quassan for sawfly](#)

June 16, 2023 12:02AM

Registered: 1 year ago

Posts: 21

Hi David,

I am very interested in participating in a research study- we are actually located in Ontario. The only hitch right now is we went to visit Newfoundland and fell in love with the place and are now seriously thinking of moving there after having been at our farm since 2005. If a move to Newfoundland does not materialize and we stay at our current place I would very much like to be in a study. I am happy to reimburse you for any costs related to my participation. Thank you for the offer.

My coordinates are:

Carol Gudz (Bastard County Fruit Farm, zone 5b)

Email: sumac.carol@gmail.com

Phone: 613 698-1788

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