



Japanese-style Apple Bags

Posted by [Brittany Kordick](#)

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[Brittany Kordick](#)

[Japanese-style Apple Bags](#)

January 06, 2020 11:11PM

Registered: 4 years ago

Posts: 209

We've been interested in apple bagging for years and played with it on and off. We'd like to give it a more thorough shot this spring on one variety of early apple that we have particularly bad curculio and disease issues with every year. There's been sporadic articles and studies over the years, usually using paper or plastic bags improvised by American growers or researchers. Does anyone know of a source for the bags that the Japanese are actually using? Anybody outside of Japan doing more than playing around with this?

A slightly related inquiry: in articles about the Japanese bagging practice, the art of "tattooing" particularly exceptional fruits is often discussed in tandem. Surprise -- we're also interested in doing our own tattoos on some fruit! Anybody know of a source available to Americans for fruit tattoos?

Thanks much,
Brittany Kordick

[Kordick Family Farm](#)

Westfield, NC

Zone 7a

[Reply](#) [Quote](#)

[James Smith](#)

[Re: Japanese-style Apple Bags](#)

January 09, 2021 08:30PM

Registered: 2 years ago

Posts: 57

Your topic piqued my interest, so I did some Googling and came across these articles and one source.

[[magazine.uc.edu](#)]

[[www.brucegoren.com](#)]

[[www.wilsonirr.com](#)]

I may have to experiment.

Washington Okanogan Valley

Zone 6b

[Reply](#) [Quote](#)

[Brittany Kordick](#)

[Re: Japanese-style Apple Bags](#)

January 13, 2021 04:34AM

Registered: 4 years ago

Posts: 209

Thanks for posting those links, James! Our bagging trials made the back burner last season, and probably will this one, as well, but it's still an interest for the long-term. I actually have a Japanese "in" -- we hosted a foreign exchange student from Japan when I was growing up, and we still keep in touch. I've hinted in correspondence that I would love any information/material about the practice. I traveled to Japan years ago, and certainly enjoyed viewing and tasting the perfect apples, but it was long before we were orcharding commercially and would have thought to inquire about visiting any orchards. Certainly on the list for any future trips, though.

Brittany

[Kordick Family Farm](#)

Westfield, NC

Zone 7a

[Reply](#) [Quote](#)

[Brittany Kordick](#)

[Re: Japanese-style Apple Bags](#)

February 22, 2021 07:51PM

Registered: 4 years ago

Posts: 209

Come to find out that stateside Dr. Guido Schnabel of Clemson University has really championed fruit bagging, particularly in peaches, as an alternative to spraying in fruit crop production. You can order Chinese-made fruit bags through his program at Clemson, as long as you don't intend to re-sell them. We obtained a sample bag from him. It's hard to imagine a full-size large apple fitting in there (you couldn't fit the bag over a full-sized apple, at any rate, but placement of the bags occurs when the fruits are still very small), and I don't necessarily like the idea of the fruit touching the sides of the bag, however much breathability there is. However, it looks like the fruit could burst the paper bag if necessary once it reaches full size ahead of, but still fairly close to, harvest, when a lot of the pathogenic infection windows and insect pest threats have passed. We're intending to

conduct a more serious trial in our orchard this year, placing a few bags on all our different varieties of apples. If it works, we know we can't bag our entire crop, but we may find that it really makes a difference for certain dessert apples that we otherwise aren't able to produce much of, and thus, would be justifiable in some blocks.

Here is a link to Dr. Schnabel's Clemson site; it includes a video demonstrating bagging, bag pricing, and the online order form: [www.clemson.edu]

Brittany

[Kordick Family Farm](#)

Westfield, NC

Zone 7a

Edited 1 time(s). Last edit on 02/22/2021 07:55PM by Brittany Kordick.

[Reply](#) [Quote](#)

[Brittany Kordick](#)

[Re: Japanese-style Apple Bags](#)

May 19, 2022 09:03PM

Registered: 4 years ago

Posts: 209

Finally getting around to playing with Japanese apple bags this season. We ordered 200 of them from Wilson Orchard and Vineyard Supply in Yakima at the cost of 9 cents per bag plus shipping, with the intention of putting 5 bags per block in many of our apple varieties. Some varieties we didn't bother bagging at all -- crab apples are too small to justify and we want them to bear in clusters, not thin them down to a single baggable fruit. Likewise, the growth habit of certain varieties precludes bagging, for example, spur bearers like 'Lady,' which also were disincluded due to diminutive size anyway. Otherwise, we tried to hit as many varieties as we could, even if we think it unlikely that we could ever justify bagging them, just to see which varieties showed the most quality improvement with bagging.

It will be months before I can report on whether the bags improved our fruit quality or not, but plenty of initial takeaways post-bagging:

This is definitely a love it or hate it job; I love mindless, tedious work like handweeding or apple bagging . . . but a lot of people don't. Another appeal for me is the skill level and art aspect of farming involved. It's just neat and I like being this kind of masochist. I can conceive of the time and labor of bagging apples -- not orchard-wide -- but in a few select varieties, similar to hand-thinning certain varieties, but not most. It's easier than it looks in YouTube videos (my technique isn't particularly consistent, as varieties don't grow consistently; I gather the bag as best I can, and mash the wire over; it ain't origami style in this orchard), but I'm testing the bags as best I can to make sure they're as secure as they should be. I will be interested to see how they do in our generous winds. I'm interested in how they would do in a hailstorm, too, but I hope I don't get the opportunity to report on that; perhaps they would confer protection and might be another reason to consider deploying them. Or perhaps the hail would puncture them and make an unholy mess. Inevitably, some apples get broken off in my quest to bag them; again, some varieties are easier than others, and larger, longer-stemmed apples are easiest. But the larger the apple, usually the longer it's been on the tree and potentially no longer the pristine apple you want to be bagging.

Which leads me to the biggest point: this went much faster than I would have thought, but the most time and biggest challenge was identifying apples worthy of bagging in the first place. There's not much sense in bagging a curculio stung apple since it may fall off. There certainly can't be any evidence of disease there already as you're just sealing any inoculum in. And there's not much sense in bagging a less than perfectly shaped, pristine apple, since presumably you're going to try and get a higher price for these babies and a wonky shape is going to preclude that (remember, these bags are used in Japan to produce exorbitantly priced, flawless fruit of distinction and good fortune . . . and cha-ching, you're going to pay for it). So preparation is key here, as well as timing. You are going to want to be working with a thinned tree for the biggest eventual fruits and ease of bagging (though I have bagged several apples where I left another unbagged beside in the same cluster to compare results) and you're going to want to have maintained your trees to this point of bagging as well as possible. The fruit can't be wet. If there are spray applications you'd like to make to your fruitlets pre-bagging, you need to get them done, let them dry, but if these apps are for pest/disease pressure, you don't want much time to pass before starting to bag . . . and you're going to need a lot of time to bag.

What is really hard for me to conceive of at this point:

Going back and removing the outer paper bag from the inner wax paper one later in the season to allow coloring to occur. Forget about this time and labor; it just seems like a much more delicate business than getting a bag on in the first place. Also, doing this on an entire MM111 tree. The idea just makes me laugh. I didn't even add a ladder into the mix for this test bagging, and found I really needed to move in unpredictable ways to get some bags on.

Best hopes for apple bagging:

I think apple bagging could be invaluable for growers trialing a new variety -- you've got a tree in your test orchard; it's going to be years before it bears properly, but leave an apple or two on a small tree and bag them so you're assured of an early sample. Having something to recommend to frustrated homeowner buyers of our apple trees who do not know how to take care of apple trees and don't want to learn, don't want to spray them in any way, etc., just want some organic apples asap (usually, we don't know what to say to these people). Also, I just think it would be quixotic and cool to try and sell an American a \$75 good fortune apple (I can't wait to try tattooing our apples).

One potential issue with apple bagging: remains to be ascertained whether or not most bags are treated with trace amounts of chemicals. We are using bags with a logo of an "H" in a star, but noticed on another vendor site that sells bags similar to ours, but not the same, a warning to wear gloves because bags are treated with trace amounts of Captan and something else. I sure hope that's not why apple bags are supposed to work so well, because it's standard to treat the bags with chemicals. The traceability on these bags isn't great, and while Wilson is very interested in getting an answer for us (not least because they had no idea of this potentiality and they touch these bags with bare hands all the time), they have hit a dead end. The bags are kind of a novelty import to the US, so OMRI approval isn't really in the cards, though Japanese bags are recommended often enough for

small scale organic production.

Also, can't imagine reusing these bags year over year, but we'll see.

[Kordick Family Farm](#)

Westfield, NC

Zone 7a

Edited 2 time(s). Last edit at 05/19/2022 09:14PM by Brittany Kordick.

[Reply](#) [Quote](#)

[Shane Patrick](#)

[Re: Japanese-style Apple Bags](#)

May 20, 2022 02:05PM

Registered: 2 years ago

Posts: 22

We got a bag of bags from Clemson this Spring. Just approaching petal fall here in Maine so we have a little time to watch the videos and perfect our technique. We plan to stencil names of our nieces and nephews on apples and give them each an apple this fall. I want to bring a few of the extras to the farmer markets to display as conversation starters and have considered a sign-up sheet/order form for those regular customers who want a unique gift for someone. Could very easily become too big of a hassle...vinyl stickers do intrigue me. One of our markets is tourist-centric and selling ten or twenty Cortlands with a lobster sunburned on the skin would be a wonderful way to pay for the gas to fill the tank on the pickup.

Here's a second request to the hive mind for a source of vinyl stickers. Typing "Japanese fruit tattoos" into the search engine provided amusing but unhelpful results.

Shane Patrick

Pleasant Pond Orchard

Richmond, Maine

5B

[Reply](#) [Quote](#)

[Brittany Kordick](#)

[Re: Japanese-style Apple Bags](#)

May 20, 2022 02:34PM

Registered: 4 years ago

Posts: 209

Can't wait to hear how the Clemson bags work out for you! I was checking that website again yesterday to see if there were any updates beyond the flurry of media attention back around 2016 surrounding Dr. Schnabel's hopes to ignite an organic peach industry in the Southeast via bagging (couldn't find anything new, but glad to see you can still order bags from Clemson). It would definitely be a big plus if the Clemson bags do the job as a single layer bag that allows for fruit coloring and you don't have to go back and remove any outer bags. When we ordered a sample bag previously, we thought they seemed a little small to allow for our average large apples' growth, and the Japanese bags we ordered this year are a few inches longer . . . but there are plenty of large peach varieties out there that the Clemson bags will supposedly work on and they're certainly recommended for apples, too, so they're probably plenty big enough for most apples, too, and it's just in our minds.

So glad to hear from a fellow apple tattoo enthusiast, and one who is actually going to try to make it happen via stenciling. Great idea!

[Kordick Family Farm](#)

Westfield, NC

Zone 7a

[Reply](#) [Quote](#)

[Brittany Kordick](#)

[Re: Japanese-style Apple Bags](#)

May 20, 2022 11:47PM

Registered: 4 years ago

Posts: 209

Wow, I feel a separate fruit tattoo thread in the making. Forget you, fireblight, I've got vastly more important things to consider . . . lobster tattoos on apples, for instance. I was just thinking about your vinyl sticker comment. Even if we found a source for "Japanese apple tattoos" stateside or imported, the stickers themselves are probably pretty standard iterations of good fortune and appropriate catchphrases for other Japanese occasions. Odds are we couldn't order up, say, lobster apple tattoos from the average apple sticker producer.

I was just thinking that the labels we use on our apple cider syrup bottles are die-cut shapes on vinyl sticker sheets that a local graphic design firm prints for us. We could definitely ask them to print plain silhouette shapes of lobsters, text, lobsters *and* text (yeah, buddy), or virtually anything else our hearts could desire. However, I know that our vinyl stickers can pucker if they aren't placed just right on the glass milk bottles we use for syrup; I have a hard time imagining sticking them on a sphere without puckering occurring in places, preventing them from laying flat. Perhaps the graphic design folks can recommend a better material (and honestly, while we adore the quality and washability of our labels, the thick stack of vinyl backing sheets we end up with post-labelling never ceases to bother us -- talk about breaking down never -- I would be thrilled if apple tattoos didn't have to be vinyl stickers or super-thick vinyl stickers).

I guess with your Clemson bags, your apples will color gradually throughout the growing season, so you would need to adhere tattoos before bagging, early on. With ours, we wouldn't put the tattoos on until we remove the outer bags a few weeks pre-harvest. I doubt it will be anytime soon, but we'll try to get up with our graphic design folks about printing us some vinyl stickers. I'll bet we can figure out something. Lobster apples need to be a reality, not just the stuff dreams are made of!

[Kordick Family Farm](#)

Westfield, NC

Zone 7a

[Reply](#) [Quote](#)

[Brittany Kordick](#)
[Re: Japanese-style Apple Bags](#)
May 21, 2022 08:38PM

Registered: 4 years ago
Posts: 209

Geez, you know we've got it bad when I get my mother thinking about apple tattoos, too. She had a great idea to contribute: a Cricut machine. You can work with much thinner vinyl and die-cut your own designs, get materials locally, etc. Might be prohibitively expensive to purchase a machine, but they're so trendy right now, a lot of people have them anyway for other crafting.

I also realized I mis-thought the Clemson bag/tattoo scenario. I'm not sure if tattooing will work with the Clemson bags at all since the fruit colors naturally as it grows. I was thinking that you'd put the tattoo on pre-bagging, but of course, no, you're bagging little fruitlets; you need to wait until your apples are full-sized to tattoo them . . . but by that time, the coloring process is underway.

[Kordick Family Farm](#)
Westfield, NC
Zone 7a

[Reply Quote](#)

[Brittany Kordick](#)
[Re: Japanese-style Apple Bags](#)
July 26, 2022 08:22PM

Registered: 4 years ago
Posts: 209

Now that we've reached harvest time on a number of our bagged apple varieties, I feel comfortable shouting from the rooftops that I am thrilled with the results. It is rare that I remove a bag and do not find an utterly flawless apple right next to rot-lousy ones, sooty blotched/fly specked ones, etc. In the rare event that something has gotten through, it is minimal, and usually with good reason (i.e., the bag has become open at the top). We are truly impressed that the bags can so effectively exclude fungal spores. I mean, that was my primary concern, that there's no way a bag could exclude microbes, given that the bags still allow ventilation and do not exactly seal the apples off from the world.

I am a little dismayed in how many bags came down, with or without apples. In the weeks immediately following bagging, I had to re-attach more bags than I'd like after they blew down . . . but I write that off as shoddy original bagging since I know my technique needs practice and improvement. Still, if you've attached hundreds of bags to a tree at just the right moment, it won't do to find 10 percent of them on the ground the next week. We also experienced a lot of premature fruit drop this year, presumably due to overcropping and/or high temperatures. I have found some bagged apples on the ground months after bagging with flawless apples inside, but again, not what you want to see if you've spent considerable time and money on bagging.

Also, definitely found bagging dozens to hundreds of varieties to be impractical, given that you have to keep up with removing that outer bag a few weeks before ripening . . . no way we can keep up with all that different timing. Bottom line, we intend to bag some entire trees and blocks next season, but limit it to a handful of varieties where it makes the most sense (large, dessert apples, the most rot-susceptible varieties, etc.)

[Kordick Family Farm](#)
Westfield, NC
Zone 7a

Edited 1 time(s). Last edit at 07/26/2022 08:25PM by Brittany Kordick.

[Reply Quote](#)

[Brittany Kordick](#)
[Re: Japanese-style Apple Bags](#)
September 07, 2022 08:56PM

Registered: 4 years ago
Posts: 209

A couple more interesting things to report about Japanese apple bags as we begin picking later varieties that had some bags in the mix. In the earlier part of the season, I was astounded to find that the bagged apples had zero sooty blotch or flyspeck and that the bags could provide such good protection, even once the outer paper was removed and the wax paper underlayer (which is open at the bottom) was all that remained. As the season has progressed, however, and the sb/fs pressure picked up, I am seeing more bagged apples with some sb/fs, albeit significantly less than unbagged apples, which may be positively gray with it. It's interesting to see how the physical barrier works -- often there is sb/fs covering the wax paper, sort of taking the hit for the apple, which then has decreased incidence. It would seem that the sb/fs organisms cotton to the wax in the paper the same way they do to the natural waxes produced in the apple skin.

Here's what is really blowing my mind: for the most part, I've been leaving at least one bagged apple in the trees per variety to try and observe long-term fruit effects, and I'm seeing apples that eventually fall off the tree due to virtual disintegration from overripeness (rather than pathogenic rots) rather than drop when the other ripe apples in the trees did. We're talking a month or more later. Down here, Wolf Rivers are harvested the first week of August (I know -- madness). They are one of our very worst for fungal rots, and this is the first year we've managed to get any apples to speak of, but after picking those with no to minimal rot, we never got back to fully clean the trees and take the more serious processing grade apples. Needless to say, whether due to ripeness or rots, the apples were long gone by mid-August. Except that I noticed walking by today, September 7th, that I missed one bagged apple. To my delight, I found it to be pristine and still hanging on tight! I saw this also in the Red Gravenstein block and others, where apples hung on for a month, looking good, long after the rest of the crop had dropped or been picked (and there are always apples, decent ones, that we don't manage to get because we can't reach, etc., so it's not always just rotten, crappy apples that are left to fall with time).

We are plagued by premature drop due to heat stress, as well as early ripening, so I am very excited to find that apple bags appear to mitigate heat stress (this is my theory for this crazy retention post usual ripening times and during the high heat of summer). If this interpretation is correct, I'm sort of puzzled by how bagging an apple does mitigate heat stress to the point that it prevents abscission. I would expect such an effect if I mitigated heat stress for the tree itself (by growing under shade cloth or applying PurShade, for example), not that effectively shading a fruit would prevent its abscission (presumably due to heat stress relief).

[Kordick Family Farm](#)
Westfield, NC

Zone 7a

Edited 1 time(s). Last edit at 09/07/2022 08:56PM by Brittany Kordick.

[Reply](#) [Quote](#)

[Shane Patrick](#)

[Re: Japanese-style Apple Bags](#)

September 08, 2022 01:24PM

Hi Gang,

Registered: 2 years ago

Posts: 22

Brittany, we never got around to bagging this year. I did get the bags, so am one step closer. Some thoughts regarding Wolf Rivers and the possible benefits of bagging. We have several WR's in the twilight years of production. We had a better than last year fruit set this season and I was pleased to think we may have a significant harvest. Then came the hot spell and lack of moisture. The WR's suffered much more sunburn than any of our other varieties. We'll be lucky if a bushel remains between six semi-standards.

So maybe your bagging provided the shading desired by a variety that first grown a long, cold ways from where you harvest them when we're picking Red Astrachans.

Shane Patrick

Pleasant Pond Orchard

Richmond, Maine 5b

[Reply](#) [Quote](#)

[Craig Bickle](#)

[Re: Japanese-style Apple Bags](#)

September 12, 2022 03:54PM

Registered: 2 years ago

Posts: 82

You've got me really thinking about how many apples I could bag next season, Brittany and Shane. Now that I have an apple crop, I'm finding my CM and PC game is not up to snuff. This year, I abandoned Surround sprays after only a couple initial light coatings because the powder residue is apparently impossible to remove from my sprayer entirely. It seems to react with the oils in the Neem and fish to coat every crease and crevice with Surround for a permanent buildup in the tank. I'm sure the same is happening in the filter, pump, tube, etc.

So I was considering getting another sprayer to use exclusively for Surround applications. My orchard is still small enough that I can get by with a battery-powered backpack, though as I add more trees in coming years a tractor-attached sprayer will be necessary, so... TWO sprayers?! That can't be right. And as for CM, my forest location is overwhelmed with the things, so additional targeting strategies are in order for next year (though I'm mindful of Claude's testimony that for cider, stung and misshapen apples aren't a major concern, provided your trees will still produce enough fruit that get to ripened maturity.)

Anyway, bagging could be the answer, at least for saving a dozen or so apples from each tree. The Clemson bags look very easy to apply, and I can spare a day or two in May to twist them on. The possibility of clean, round apples without having to time sprays perfectly is almost too enticing to resist. So next year, I too may have a report to share with the Forum! Just wanted to say 'Thanx' for the info and inspiration. Very helpful.

Craig Bickle

Hap Woods

Zone 6a

East-Central Ohio

[Reply](#) [Quote](#)

[Josh Willis](#)

[Re: Japanese-style Apple Bags](#)

January 04, 2023 09:41PM

Registered: 6 years ago

Posts: 133

Thanks for all the reports, Brittany. I assume you put the apple bags on right after petal fall, before June drop?

Earthworks

Zone 7a in West-Central MD

Non-commercial, ~100 fruit trees, dwarf to MM106

[Reply](#) [Quote](#)

[Brittany Kordick](#)

[Re: Japanese-style Apple Bags](#)

January 05, 2023 03:31PM

Registered: 4 years ago

Posts: 209

Yes, obviously, you want to get those bags on as soon as possible to glean protection as soon as possible, but you're kind of stuck waiting for the fruits to size up to the point that you can get the bags on. So between petal fall and June drop is about as accurate as I can say, broadly speaking -- some varieties put on a lot of size earlier than others, so it's pretty variable. I was disappointed to find that the fruitlets were too small to bag during prime curculio time, so did not get as much protection in that regard as I had hoped. On the other hand, since you're probably going to want to have those fruitlets bagged pre-June drop, you may end up with bags that drop along with those fruitlets, and must be retrieved for re-bagging. Obviously, you can't predict 100% which fruitlets will be lost to June drop, but vetting your fruitlets and hand-thinning to id the best candidates for bagging goes a long way (don't waste your time on a fruitlet that has curculio stings, for instance, nor attempt to bag multiple fruitlets on a single spur).

[Kordick Family Farm](#)

Westfield, NC

Zone 7a

[Reply](#) [Quote](#)

[Josh Willis](#)

Registered: 6 years ago

Posts: 133

[Re: Japanese-style Apple Bags](#)

January 05, 2023 08:01PM

Ah yes, you hit upon all the concerns in my head! Both in terms of timing for the sizing and bags, and the potential drops. My memory is the last time we tried to bag, a fair number ended up on the orchard floor in June, as you say. This was especially annoying b/c at the time, most of our fruit was still on the big "semi" dwarfs we have growing, making it harder to bag. We do have some actual dwarfs starting to fruit, so that may make this all a little better.

Good to hear your experience. Thanks!

Earthworks

Zone 7a in West-Central MD

Non-commercial, ~100 fruit trees, dwarf to MM106

Edited 2 time(s). Last edit at 01/05/2023 08:02PM by Josh Willis.

[Reply](#) [Quote](#)

[Brittany Kordick](#)

[Re: Japanese-style Apple Bags](#)

August 11, 2023 03:52AM

Registered: 4 years ago

Posts: 209

Ha -- when last I checked into this thread, I stressed that one should never bag already flawed fruit, such as those exhibiting curculio stings or any other existing condition that might cause the fruitlet to abscind prematurely, taking your carefully placed bag with it. After last year's promising experiment with doubled walled Japanese style apple bags from OVS, we had planned to bag extensively in our orchard this year. Unfortunately, OVS lost their supplier and has not been able to find a new one for the bags. We searched high and low and found only one other promising source of double walled bags -- a Chinese company called Agrow-Tek that appears to manufacture fruit protection bags for all sorts of fruits. We and 7 Springs Farm Supply tried to contact them several times, but could never get a response.

Finally, we decided to order some of the single walled bags from Clemson University. As recently as last year, Clemson had offered quantities in as high as 10,000 bag increments. When we checked this time, they only had 1,000 bag increments available and Dr. Schnabel let me know that we could certainly purchase 10,000 bags, but they could not change their online ordering system to give us the sensible break on shipping (they would literally box up 10 boxes of 1,000 and charge us accordingly, to the tune of \$150 extra for shipping). Just couldn't do it on principle. The clock was ticking and the fruitlets sizing up, and we really, really wanted to keep going with our bagging experiment. Finally, rather late in the season, we decided to just buy 1,000 of the Clemson bags to at least try them.

We decided to focus on a single variety and bag entire trees to get an idea of how many bags it would take to do a properly thinned mature MM111 tree, and how feasible the bagging itself would be in such a situation. We were a couple weeks late in getting started with the bagging, due to all the back and forth, and much to my dismay, most of the fruitlets on our chosen trees already had curculio stings and/or other damage that would usually have been disqualifying. We ultimately decided to go ahead with the experiment, again, just to get some more data, knowing that many of the fruitlets would probably fall off prematurely.

Fruit bagging is definitely something where practice makes perfect. It is a tedious task and if it's not to your liking, you probably won't last 5 minutes. But once you get the hang of it and develop your technique, it's surprising how fast it goes, even thinning along the way. And some apples will be easier to bag than other, in terms of tip bearers vs. spur bearers. I personally enjoy the process. It's probably the most time I would spend with a single tree all season and I find the resulting bagged tree to be beautiful. I was shocked at how many bags it took to bag a tree with a good crop of fruit.

To some degree, this year's experiment was a failure. We had not allocated time for bagging since we didn't think we'd procure any bags, and since we were late in starting, other tasks were competing for time. Since I was bagging fruit I assumed might fall off in the end, it was easy to get called away to other tasks. I ended up bagging only two trees two-thirds of the way before I got called away for good. I want to stress that it wasn't that the bagging took too much time and effort, however, but rather that I was just one person and had too much going on. It does take a long time to bag a tree full of apples and you're going to need to step away and do something else after a while even if you like doing it, but I consider it time very well spent and totally doable on some commercial scale if planned for properly and if you have more than one person doing it.

Still, I was shocked that I used up about 80% of my bags on those two partially bagged trees -- I remember that I wasn't sure if I would have enough bags to finish. So that will help to plan, number-wise in the future. Predictably, I lost a lot of bags in the ensuing months. Some of that is inevitable -- you're going to damage a stem here and there, which will eventually cause a fruitlet to abscind prematurely. But most of the dropped fruit was absolutely due to curculio oviposition or other damage, confirmed by the percentage of unbagged drops from the same trees.

We just harvested the orchard block that included our bagged trees; the variety is 'Burford's Redflesh,' and was chosen simply because we lose most of the fruit to black rot every year and it is in high demand by cidemakers (obviously, cider fruit is probably not what we'd choose to bag in most cases). Also, the trees are relatively small and I had previously thought it possible that I could potentially bag our 5 mature trees completely with 1,000 bags (not a chance). Even after losing so many bags to premature fruit drop, we harvested a few hundred bagged fruits out of what I would estimate to be about 800 original bagged fruits.

I had many misgivings about the Clemson bags going in; I really, really liked the double walled Japanese bags we used last year and I thought the Clemson bags, actually meant for peaches, would prove too small for many of our apples, based on a sample we'd previously procured. I never thought I'd say it, but I really liked them.

Since my fruits were already damaged at bagging, I did not bother tallying up perfect vs. imperfect vs. unsellable fruits. My overall impression is that the Clemson bags do not protect the fruit quite as much as our previous bags (double walls, double protection) did, but the side by side comparisons were very impressive. As with the previous bags, the biggest visual difference in fruit is that the paper bag takes the sooty blotch/flyspeck hit for the fruit. Unbagged fruits are grey with mold bloom while bagged fruitlets are the color they were born to be. Most bagged fruits had zero

incidence of black rot, compared with, oh, maybe 25% of fruits with black rot for the rest of the unbagged tree (this was actually the best year we've experienced, as far as fruit rot incidence, to date in the orchard at large; usually, incidence is much higher). Conversely, though, some bagged fruits did have black rot incidence, and when they did, it was always progressed to the point of sporulation and larger, more developed spots. If a bagged fruit had rot, it was progressed to the point of unsellable, not second quality, presumably because the bags do hold in more moisture and protection developing pathogens from UV radiation to some extent.

Which brings me to the last notable point about the bagged fruit: since the Clemson bags do not have a solid outer wall that blanches the fruit for much of the season, the fruit can color up fine, but of course, there is some interference with light penetration. The bagged fruits were coloring up just fine, but appeared to be three or four days behind the unbagged fruits in terms of fullness of color. We performed starch tests on both bagged and unbagged fruits and there wasn't significant difference between the two, however.

It's looking like Clemson single-walled bags are all that will be available to us domestically next season, and I won't hesitate to use them again. If there's a very slight difference in effectiveness where exclusion of pests and pathogens are concerned, the ease of use (removing one bag, rather than two, and not having to worry about timing the initial bag removal just so) more than makes up for it. Speaking of bag removal, this does, of course, add a step to the harvest process, which inevitably adds up, but again, it was not hugely significant to me, time-wise. I could reach for a piece of fruit and with one hand remove the bag, drop it, then go in for the pick, or simply pick the piece of fruit bagged and tear the bag off afterwards. Either way, there's childlike glee to be had with each unwrapping, as if it's a gift, which . . . it sort of is. The bag waste really doesn't add up to much. I balled them all up and put the few hundred in one old feed bag and it will sub in for newspaper to start four or five fires this winter, that's all.

Size-wise, a large Burford's Redflesh fruit is tight against the paper walls of a Clemson bag, and I still think using a Clemson bag to protect a huge 'Wolf River' apple would be foolhardy, as it would burst the bag open at the top, allowing pathogens and pests to get in well before harvest. But I wouldn't hesitate to use them on an average large apple.

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