



Public Comment at May 14 Non-Chemical Weed Control Tools Meeting

The following are questions the public asked the panel of experts and MMWD staff at the May 14 non-chemical weed control tools workshop. The vegetation management experts at that meeting included Dr. Carla Bossard (a weed control expert and professor at St. Mary's College), Jeff Creque (a grazing expert with Land Stewardship Consultation), Mark Heath (a weed control expert with Shelterbelt Builders), John Herr (a biological control expert with the USDA Research Center in Berkeley), and Tim Hyland (a weed control expert with significant expertise in prescribed burning with the California Department of Parks). Also answering questions were Janet Klein and Mike Swezy of MMWD and Leonard Charles, one of the consultants for the project.

Q: Is broom the major weed problem?

A: Broom is the most extensive invasive weed on the watersheds; yellow starthistle is the second biggest problem. Up to 65% of oak woodlands are infested with broom. (Klein)

Q: Does it make sense to apply 80-90% of our resources towards broom control?

A: Priorities may be different depending on specific populations in specific areas. Because early detection and rapid response is key, we may prioritize initial populations of certain invasive species to get them under control. Protecting infrastructure and creating fire breaks also factors into prioritization. (Klein and Charles)

Q: Would it be feasible to use Douglas Fir in broom plantations to allow the fir seeds to disperse, get the seedlings to compete with broom, then cut down the Fir and use it as a fuel source to burn the broom population and eliminate the seed bank?

A: In Australia a similar tactic has been used, with broadleaf trees. Once the broadleaf trees have grown to the point where the closed canopy is deeply shaded (a reduction of 90% of sun) then the broom can be shaded out. But in this case the stand is not cut and burned. (Bossard)

A2: We have done this in one instance, using a Monterey pine forest. We got some competition but there were openings in the cover so we still had flowering broom plants. In the scenario you mentioned, since the broom would flower the whole time the Fir is growing, we would get a continued addition to seed bank. Also, creating that amount of fuel in a habitat might be destructive. (Bossard)

Q: I want to know what the people management problem is when it comes to goat use.

A: With a complex vegetation situation there is a real need to have someone be aware of what is going on. Typically goats are managed by someone who knows them well and does not necessarily understand the vegetation. What is required is to have someone onsite continuously to make sure that the goats are consuming the targeted vegetation. We have had experiences in which goats are more interested in other species than the weeds. You can work directly with goats and guide them, direct them to eat seeds, and it's effective but very intensive management. And that won't fully eliminate the stand. In many cases it would cost less to do the job with humans than with goats. (Creque and Klein)

Q: Would you use goats the second or third year after initial removal when the seedlings are small?

A: Goats prefer broom that is more mature. They can just ignore stands of seedlings. There's a seasonal component to it – it is most effective to have goats debark the broom, which happens when the plant is a bit older. (Creque)

Q: Would goats wind up driving the seed bank down?

A: Goats can over-impact sites. At the same time, goats can go through a broom stand with no understory and pick up seeds. Once they are focused on seed they are good at vacuuming up the floor. Goats can actually even look for seeds, to a point. (Creque)

Q: For basal bark application with French broom, roughly when is the key time for application in this region?

A: At Jackson State Demonstration Forest (north of Fort Bragg) it is the last two weeks of June in a normal year, when seeds are plump and pods are fully green but haven't turned black and started to open yet (i.e., when pods are just starting to turn color), then photosynthesis is very high and sugars are being sent to the roots for storage. That's when you'd want to do it. (Bossard)

Q: For a prescribed burn to eliminate the seed bank in a dense stand of broom, how feasible would that be? Would that depend on mix of adult and juvenile plants?

A: Mature broom will burn really well under very dry weather conditions and can start juveniles burning. Broom is not easy to burn with a prescribed burn because all the fuel is at the crown. You have to cut the stand first and let the plants dry to get a good prescribed burn. (Hyland)

Q: For your eight-acre demonstration forest at Jackson State Forest, how much herbicide was used over those eight acres?

A: We used a concentrated herbicide. We used herbicide at a 22% concentration rate, and when we mixed it we used less than a gallon over the whole site. We used very little of it but it does take more time to go around and touch each plant. However, it was cheap and we had a very effective kill. Every place we treated resulted in dead broom and it was faster than some of the other methods (e.g., hand pulling). (Bossard)

Q: What biological controls have worked for broom?

A: We started a program in 2000 to find biological controls for broom. We have tested two potential insects – a weevil and a psyllid. The psyllid was more promising but it feeds on non-target plants, including lupines. We are not comfortable releasing something that may work on non-targeted plants. So right now we have no specific control for French broom. We are working on five weeds currently, and the salt cedar is working the best so far. Biocontrol has a long ramping up period that can take ten years for exploration and testing. We have two promising agents right now for Cape ivy – one is a fly that causes balls in the stems and the second is a small leaf and stem mining moth that can take the whole plant down. The latter agent is waiting for USDA approval. (Herr)

Q: Do you anticipate legal restrictions on using prescribed burns?

A: It is very difficult to do in California, and certainly in the Bay Area. Air quality is a key concern, especially around population centers like we have here. Prescribed burning is difficult to do to the point of being unreliable. You cannot plan on burning at specific times because it may not be feasible. In chaparral and brush communities burning is hard to pull off due to air quality and liability concerns. Fire protection agencies are focused on fighting fire and not on prescribed burns. (Hyland)

Q: What is involved in prescribing burns?

A: A prescription is a set of environmental parameters under which you'll light a fire. Parameters include wind speed, direction, relative humidity, temperature, sky conditions, expected weather, fuel, and others. It is expensive, you need huge resources, and you have to act on short notice (typically only 12 hours in advance). It is logistically very difficult to do. (Hyland)

Q: Is the carbon dioxide production for burning the same as for letting detritus decay?

A: Great question – I don't know! (Hyland and Bossard)

Q: How long is the phase for basal bark application – what is the window you need to use?

A: Generally once you get past the end of July, at least in the Sierras, and the leaves get red and crispy and dry, it's not peak photosynthesizing any more. In

the Bay Area, the difference between peak rate and low rate is less, but there is still a big drop-off after seed has been released. (Bossard)

Q: Can goats detect that too?

A: I suspect they do. As sugars drop, they would be less interested in consuming the broom. (Creque)

Q: We had a discussion about having seeds move further down in the soil profile when a plant is pulled out or disturbed. Do you have any information about hand weeding, whether more plants are recruited?

A: In my experience, using soil cores in an area where broom was not disturbed, where it had been hand-pulled, and where it had been cut, the increase in depth at which we found seed varied from 1-5 cm deeper when pulled than when not pulled, simply because you're pulling roots out and opening a big hole in the ground. Some of the seed falls farther down. We prefer to cut rather than pull. (Bossard)

A2: In the interim non-chemical weed control tools report there is a table on that. We've done a lot of counting on broom. It is not a rigorous academic study, but we have been looking at sites where we've hand pulled or sites where we've just mowed or burned. For hand pulling it took twelve years to get down to 16,000 stems per acre. It never set seed but we were constantly pulling it up. We had very high levels of germination until about three years ago. Where we mow and follow up with herbicide application, we have gotten to that same stage within about three years. There's a paucity of data looking long-term. (Klein)

Q: Do you have any thoughts on detectability by treatment? Is it harder and harder to detect seedlings over time because of other growth coming in?

A: Whenever the amount of plant matter that is coming up decreases, it is harder to detect. But if you're doing a standardized monitoring procedure that is quadrant based, seedlings should show up. We looked at the impacts of burns two and three years out. We had grasslands in the watershed with a huge seedbank flush after the first year, but then afterwards it decreased rapidly. Potentially what was left was unreachable deep in seed bank. (Klein)

Q: With the basal bark application what happens with the seed bank?

A: First, we had to get rid of adults. Then the next thing we did was to either leave the dead broom stand as it was, or cut it, or both cut and burn the stand. When we left the fuel standing or let it lay after cutting, we had a lower incidence of seed germinating. We had maybe only 50% of the seed germinating on those stands and the ones that were cut, as opposed to the ones that had prescribed burning. We could kill seedlings easily after we prescribed burns. With existing stands, seedlings come up amongst live vegetation – much more complicated. We found the best thing was to get rid of the fuel and to then treat what's flushed. But it depends on the strategy you're using – in our case, we were intending to flush the seed bank. (Bossard)

A2: The District is looking into specific strategies and figuring out the best way to re-treat sites. We are considering whether or not to flush seed banks at specific sites. We may want to take time to work on other sites in following years. That's why we're doing this plan, to put all that information together. (Klein)

Q: When you eradicate the broom, won't other invasives or other plants come in and take over that spot?

A: Our intention at the demonstration site was to re-vegetate in year three. We didn't have to because we got so much natural germination of natives – the site was very competitive by the third year. That's not always the case. In Scotch broom stands in the Sierras near Georgetown, we have had little return of natives. It all depends on the history of the site. If you want to re-vegetate, you need to make sure you get the invasives out of the seedbank so that natives are taking over rather than invasives. Also, since broom enhances nitrate quantities in soil you have to monitor that more closely. (Bossard)

A2: It comes down to technique selection. Secondary weed invasions are very common. Often the weed control techniques chosen are highly disruptive and allow for opportunistic invasives to come in. Here, there are lots of annuals that will come in, especially if they're in adjacent parcels. You need to look at the full landscape scale of the project to see what can vector into your site, then choose the appropriate technique to not invite those secondary invaders in. You need to take a holistic approach. (Heath)

A3: The objective for eradication should be to consider what will be replacing the stand. (Presenter)

Q: When you are flushing the seed bank, how do you get a fire to burn hot enough?

A: When we cut a stand and let it lay, we use that fuel load to burn. (Bossard)

Q: If you use basal bark application are there potential issues with burning those plants in terms of having material volatilizing? With all the talk of aerial spraying for the apple moth using microparticles of plastic with pheromones, will burning those plastics be toxic?

A: Those questions are better suited for June 11 workshop when we will have the toxicologist here. We will make sure she answers that question next month. (Klein)

Q: Is anyone doing research on how to degrade the seed bank of broom by changing soil chemistry?

A: The only things I've read about experimentally were changing soil using acid and salt. You end up destroying the soil, really, and it becomes very difficult to re-vegetate. (Bossard)

Q: Could you describe torch flaming in more detail, especially the effects on seed banks and seedlings?

A: It's poorly named, it should be called blanching or steaming. It is sometimes called green flaming. You're typically only doing that to kill seedlings (plants less than 15 cm high). You have a torch with a hot noisy flame coming out of the end. You pass it over the top, you don't actually touch the plant. The heat blanches the plant and ruptures the epidermis which causes fluids to leak out of the plants. It ruptures the cells and the xylem. Flaming is done only in the rainy season because you have to be really cognizant of fire conditions. We only have our own staff do it and we're very careful about it. I don't know that it clears the seed bank. I've always used it to blanch seedlings. Also, it is difficult to use for landscape scale applications. (Klein and Heath)

Q: Are there any biological controls that work on priority weeds that the District is dealing with?

A: For yellow starthistle there are six things that have been introduced. They're only seed feeders. Yellow starthistle has a tremendous seedbank and you need to eliminate about 95% of the seed bank to see a difference. But we have been getting declining seedling recruitment in areas where agents are established. There's a fly and a weevil. Our lab in Albany has two additional insects that attack different parts of the plants – a root-feeding weevil and a moth. Maybe these agents will be able to be released. We don't have any active projects for other weeds on the District's list. (Herr)

Q: Can biological controls eradicate populations?

A: Generally not, they re-establish the natural control. There will always be low levels of the agent and weed. That is the goal, to keep both present at low levels. (Herr)