

**Splatter Gun Techniques for Bush Regeneration
Workshop and Field Day - May 2009**



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for Bush Regeneration**

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Workshop Aims and Goals

Susan and I would like to pass on to you some of the things that we have learned from using Splatter Gun on our property. We hope that today helps you in your work to regenerate and protect native forests.



Splatter Gun for Bush Regeneration

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First up, I want to tell you about how we became involved with Splatter Gun, and how our bush regeneration work fits into the broader context of the dieback that is devastating Toonumbar's eucalypt forests.

I will then discuss Splatter Gun techniques in detail. We will look at the method's key features; its advantages and limitations; effectiveness, efficiency and applicability; and the types of equipment you can use. I will pass on some practical tips, and explain what we know, and what we need to still find out about these uniquely useful bush regeneration tools. We will then discuss how you could go about planning to use Splatter Gun on your properties.

Acknowledgements and Thanks

Susan and I are very grateful to the organisations and people who have supported the bush regeneration work on Creeks Bend, and we would specially like to thank Bob Jarman and the staff at Richmond Landcare Services; John Hunter, Steve King, Craig Wall and Paul Meek from National Parks and DECC; John Nagle and Jamie Morton from the Northern Rivers CMA; Stephanie Horton; Members of the Bell Miner Associated Dieback Working Group; Daniel Stock from the Lantana Task Force; our niece Alice Yeates, who is studying bush regeneration on Creeks Bend for her PhD; Shon Schooler from CSIRO; and Grant Gibson, Dave Downes and Don and Paul Durrant for their work at the weed face.

Background

When we came to Toonumbar in the 1970s most of the State and privately owned Forests were grazed by cattle and every year, low intensity fires burnt for weeks at a time all around the district. There was a grass and herbaceous groundcover through much of the eucalypt forest, and although there were some areas of lantana, it was possible to ride a horse or walk for miles in most directions. Bell miners had always been in Toonumbar, but only in isolated pockets. In fact, on old Forestry maps the name of our property shows as "Bellbird".

In recent decades Toonumbar's bush has changed profoundly for the worst. Nowadays, there is no grazing or controlled burning in the State Forests or National Park, lantana is out of control, and dieback threatens most of the eucalypt forests.

When you visit the Toonumbar National Park, make sure you go to the fabulous World Heritage Murray Scrub, a unique, flat land, subtropical rainforest that nestles at the base of the eastern escarpment of the Toonumbar Valley. In there you will see many fine examples of Teak, Rosewood and Red Cedar, huge Strangler Figs and forests of Bangalow Palms.

As you drive up to the Murray Scrub you will see the good work of National Parks staff, where the lantana they cleared is being replaced by vigorous native bush.

Further back down the track you can compare these regenerated areas with the massive lantana banks they removed to give the forest a chance. If you look east towards the escarpment you will also see the skeletons of what in the 70s was a healthy, mature blue gum forest. Most of the older trees are now dead, and a younger generation of Blue Gums is struggling to survive dieback. If we lose these younger trees the loss of viable seed could mean the final destruction of this old Blue Gum forest.

Drive down what used to be called Middle Spur Road towards the Iron Pot Creek Camping Ground and you will see miles of devastated eucalypt forest dominated by a lower story of dense lantana thicket and a sparse upper story of trees fighting to survive massive psyllid attack and dieback.

I remember years ago reading the opinion that lantana was no real problem for the bush. It was supposed to merely keep the soil together and mulched until you had something better to do with the ground, and anyway, if left to its own devices the native bush would always come back, given enough time.

Sadly, that is not how things turned out. The forests are full of lantana patches that for decades have completely dominated areas where the canopy was broken. The lantana climbs high up trees, competes with saplings and full-grown trees, and chokes out all native competitors. Alice Yeates has observed that the spiky surfaces of lantana catch native seeds before they even reach the heavily mulched ground under the lantana thickets.

My idea of a worst-case scenario for Toonumbar's World Heritage National Park? A stinking hot, dry summer's day, strong westerly wind, and a fire storm fuelled by miles of lantana cuts into and even destroys the unique Murray Scrub rainforest. And areas that used to be sclerophyll forests are left as an ash bed with limited viable eucalypt seed for regeneration. To date, you only find a few camphor laurel trees in the Toonumbar Valley, but just over the ridge towards Afterlee there are camphors by the thousands waiting to seed the regeneration of the Toonumbar National Park.

In about 2000 it became obvious that Toonumbar's forests were in real trouble, and after a meeting in Kyogle in 2001 National Parks asked John Hunter to look over the Toonumbar forests. As I understand the story, after a helicopter fly-over John reported back that the dieback made it look as if a bomb had gone off in Toonumbar.

In 2002 a Bell Miner Associated Dieback Working Group was set up, and in April 2005 a forum at Southern Cross University brought together scientists, academics, conservationists, National Parks officers, Foresters and other stakeholders to discuss what has come to be known as Bell Miner Associated Dieback, or BMAD for short.

When Susan arrived home from the conference she told me about John Hunter's story of how when he visited his father's farm in Queensland he was surprised to see that a lot of the lantana had been killed off. The story went that when John asked what had happened, his father said that the locals had fixed the problem by using spray bottles to squirt, like from a water pistol, a mixture of 4 water to 1 glyphosate on to lantana as they moved around their properties. This sounded too good to be true, but it seemed to us that, if it was true, then the implications would be profound.

I took the nozzle off a hand-operated drench gun, so it squirted like a water pistol, tried out the 4:1 mix on some lantana and it worked a treat. John heard that we had tried out his father's method, one thing led to another and a comparative trial of the technique to remove lantana as a possible treatment for BMAD was supported by DECC and the BMAD Working Group. Since then, with the additional support of the NRCMA, we have applied the technique to about 200 ha of heavily lantana infested forest on our property.

Bell Miner Associated Dieback

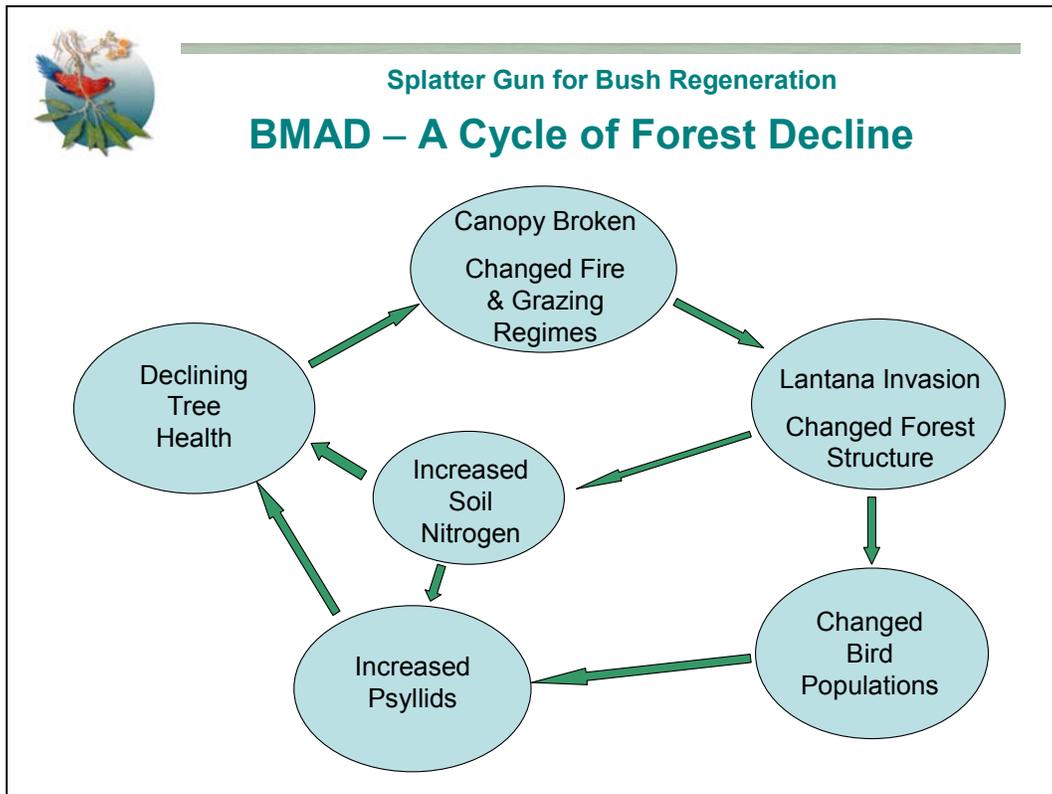
No matter how you look at it, removing lantana from native forests has to be a good idea, but, like DECC and the BMAD WG we particularly wanted to find a treatment for BMAD.

As BMAD spread through Toonumbar we could see obvious differences between affected and unaffected forests. Areas of forest that remained free of BMAD, even when they were surrounded by rapidly declining trees, were relatively free of large patches of lantana, they had few or no bell miners and a greater diversity of bird life, and they had a relatively intact canopy and a complex mid- and under-story structure.

By comparison, areas with BMAD had heavy lantana. Their forest structure was disrupted, with large gaps in the canopy and an impoverished lantana dominated mid- and under-story. Psyllids attacked just about every leaf on the ironbarks, grey gums, blue gums and flooded gums. Bell miners were everywhere and other species of birds were rarely seen.

We felt that we could not wait for a full scientific understanding of what causes BMAD, so we took what foresters call an Adaptive Management approach. In effect, this way of going about things says: Do something to fix a problem, see what happens, develop ideas, and change your approach in light of your experience.

We came to see the lantana/dieback/bellbird relationship in the following way. Broken canopies from logging & changed fire & grazing practices encouraged lantana to dominate the lower & mid stories of forests, and this provided ideal nesting sites for Bell miners. Bell miners are particularly aggressive birds and the lack of a mid-story suited their style of attack and gave them a competitive advantage over other birds that also feed on the psyllid insects that suck sap from eucalypts.



Researchers at Macquarie University have found that, unlike birds such as the pardalotes which kill the psyllid insect when they eat the sugary lerps covering, when the Bell miner feeds it tends to leave the insect behind and alive. So, you end up with more and more Bell miners eating lerps and more and more sap sucking insects attacking the trees. At the same time, the heavy lantana mulch increases soil nitrogen, which further weakens eucalypts. Psyllids particularly like new leaf growth, and the combined effects of the choking lantana, the thick mulch and the insect attack effectively prevents the native forest from re-establishing itself.

We took a systemic approach to BMAD in that we assumed that the forests might be able to heal themselves if we changed one of the key factors that supported dieback. You could target the bird population factor and killing off bell miners, and some have done that, or you could put up bird and bat nesting boxes for competing species such as parrots and pardalotes, as we have done. On a few occasions we have directly attacked Psyllids by injecting insecticide into important seed producing trees.

But, Lantana seemed to be the obvious target because it undermined forest health in so many ways.



Splatter Gun for Bush Regeneration

Lantana: A Many-headed Monster

Removing lantana hedges:

- Allows native species to reclaim under- & mid-story
- Facilitates closing of the canopy
- Changes soil composition, moisture, nutrients & light
- Removes a breeding habitat that favours Bell Miners
- Decreases Bell Miners' competitive advantage
- Increases biodiversity

When you remove lantana, native species can reclaim the under and mid-story and close the canopy; the moisture and nutrient content of the soil is changed in a way that encourages native species; you disrupt the habitat that favours Bell miners for nesting and site control; and you increase plant and animal biodiversity.

Later on I will tell you more about how the bush regeneration work is affecting the bellbirds and dieback, but now I would like to talk about how you can remove lantana.

Techniques for Removing Lantana

You can remove lantana in many ways. Each method has its pluses and minuses.

Remove it manually

You can chop lantana down with a brush hook and dig out the stumps with a mattock. This works in both easy and hard to get at places. It will make you fit, but if you are trying to clear more than a small area, by the time you get to the end lantana will have regrown where you started.

Pull it out with a tractor

You can use a tractor and chain to pull lantana out by the roots. A tractor is not much use when the lantana is deep in the bush or growing on steep slopes. Dragging a chain as you crawl under thousands of lantana bushes could drive you crazy, if the ticks and snakes didn't get you first.

Push it with a tractor

You can clear lantana with a tractor blade, and when the job is completed the ground looks clean, as if the lantana has been completely removed. On the downside, dozing lantana also removes any other native species that may have been surviving amongst the thickets. But on the upside, disturbing the soil with a ripper can stimulate regrowth of native species, especially wattles. Unfortunately, unless you do extensive follow-up work, before long the lantana will return with a vengeance, re-shooting from bits of root and stems left in the ground, and you are back where you started.

Clear and Replant

In 2004, we cleared and ripped a 10 acre patch of lantana which had virtually no established forest, and then planted 500 mixed natives. We followed-up with splatter gun on the lantana re-growth. It was a dry time, and with multiple waterings many trees survived, and the ripping stimulated a lot of wattles, Brush Box and eucalypt re-growth. The trees have now formed a dense mid-story which is keeping most of the lantana out.

From this experience we learned that clearing and re-planting is a very labour intensive and costly method of combating BMAD. There is no dieback in this area but then we planted resistant species and the regenerating forest is not the same as the surrounding indigenous forest.

Overspray with herbicide

I have always thought that using a glyphosate overspray was like applying a fertiliser for weeds. The overspray kills every plant growing in and under the thicket, and the bare ground will soon be covered in weeds again. We have used the lantana specific herbicide DP600 to over spray hedges to reasonably good effect, and this herbicide spares other native species. Two operators are needed to work the tractor and to spray the lantana. As always, tractors are not much use when the lantana is growing in hard to get at or ecologically sensitive areas.

Fire

You can burn live lantana if the fire is hot enough. I have heard that Dave Kington and others in Queensland have been studying how best to use fire to combat lantana. As I understand it, it is best to burn the lantana in late summer to early autumn while it is still actively growing. John Hunter told us that burning off at this time of year is best for regeneration because there is still moisture in the soil to support regrowth of native species.

In this area it is difficult to get green lantana burning during cooler months, and I think you would be pretty game to get it burning during the summer. Burning lantana generates enormous heat, and the fire tends to follow the lantana up the trees to the crowns. We have had good results burning lantana after previous Splatter Gun treatment.

This afternoon you will see some areas that were burnt about 20 months ago. You will be able to compare areas that post-fire have been followed up with Splatter Gun and areas that have been left to recover naturally, as untreated comparison areas. There is vigorous forest regeneration occurring in the treated areas, while in untreated areas you will see that there is a battle going on between lantana and native saplings, and it looks to me as if lantana is set to win out.

It seems to me that you'd need considerable resources, fire crews and trucks and such, to safely use fire to effectively kill large areas of lantana in this region. And of course, fire is not much use in sensitive rainforest and wet sclerophyll areas.

We now think of fire as a not to be missed golden opportunity to treat previously inaccessible areas of lantana. So much more can be achieved for so much less cost after a fire. You can easily get at and treat small re-shooting lantana, whereas before the fire you had to deal with huge hedges. Fire also stimulates wattle and eucalypt seedlings where before there was nothing but lantana. Low to moderate intensity fire does not kill lantana, but it is easy to follow up with Splatter Gun about six months after the fire when the lantana re-shoots at the base.

This brings me to the Splatter Gun techniques.

Splatter Gun Techniques

We are probably stuck with the name "Splatter Gun" even though it conjures up the wrong image. As Bob Jarman explained to me, when he hears the term "Splatter Gun" in his mind's eye he pictures the herbicide being thrown all about. I suspect that this misleading mental image also underpins comments that splatter gun would not be appropriate for use in ecologically sensitive areas.

In my opinion, Splatter Gun as it is now being used on lantana should be called something like "Stream Jet". The essential feature of the method is that a discrete and tightly confined jet of herbicide is applied to the lantana in multiple lines, a couple of metres apart that wet only a minority of leaves on the plant. It is more like a water pistol than a garden hose, and is nothing like an over spray or a shotgun splatter pattern.

Early on John found out that something like the method that his father had come up with had already been registered as a "splatter gun" use of a 1:9 glyphosate mix for treating lantana. The original splatter guns were quite small instruments, about the size of a stem injector and they were originally used to treat small bushes of lantana that re-grew in pine forests. The instructions were to "apply as an even spray to cover all foliage" in dosages of "2 x 2 ml doses per 0.5 m of bush height". Clearly, the original "splatter gun" was not developed with huge lantana thickets in mind, and we were not wetting all the foliage.

Advantages of the Splatter Gun technique:

- The method is exceptionally portable when herbicide is applied with an adapted drench gun or a LPG powered gas gun. An operator carrying a small backpack with 5 L of chemical, which weighs about half that of a standard knapsack sprayer, can treat lantana as fast as he can walk, even in steep, rugged and isolated areas. On Creeks Bend, single operators so far have treated about 200 hectares.
- Splatter gun can be used in ecologically sensitive areas. When treating large hedges of lantana the reduced chemical run-off minimises collateral damage to other plants and encourages native species to regenerate through the dead lantana. The focused nature of the herbicide jet makes it possible to selectively remove lantana from around valuable plants. Experienced users can just touch the trigger to deliver minimal, carefully directed doses to small plants.

Effectiveness, Efficiency and Applicability of Splatter Gun

I cannot give you any data on Splatter Gun's kill rate with lantana, but it seems to reliably kill individual plants and large hedges of lantana with very little re-shooting from the base or roots. Most of the reappearing lantana appears to be coming up from seed. Alice's research will tell us a lot more about lantana re-growth and bush regeneration.

We have noticed that, like this "time-lapse" graphic shows, lantana sometimes responds very quickly to splatter gun and defoliates in a couple of weeks, but sometimes it can be several weeks before you see a clear response.

John Hunter told us that he has seen the same variability in response, and suggested that slower responses might indicate a more effective kill. It may be that more actively growing plants, such as those on the north side of ridges and those that receive more sunlight, react more quickly to treatment. This hedge faced north and was well hydrated and actively growing when it was treated.

The following calculations will give you a rough idea of the efficiency of splatter gun.



Splatter Gun for Bush Regeneration

Efficiency of Splatter Gun

Time & herbicide to treat large areas of difficult terrain is highly variable

The following calculation is for a hypothetical “best case” situation

Assumptions for Best Case Scenario:

- About 1 second for LPG gas gun to discharge maximum 50ml dose
- Dose projected 10m back over & down face of say 3m tall hedge
- Herbicide lines at 2 metre spacing
- Continuous hedge, on flat, easy to walk alongside
- Operator pauses at each dose point and walks at normal pace
- Mix of 1 standard strength Glyphosate (i.e., 360g/L) to 9 parts water
- Costing on 450g/L Glyphosate @ \$155 per 20L (No LPG or additives)
- Labour @ \$35 per hour (No travel & no refill time included)



Splatter Gun for Bush Regeneration

Efficiency of Splatter Gun

Time & herbicide to treat large areas of difficult terrain is highly variable

The following calculation is for a hypothetical “best case” situation

Outcomes:

- About 4.5 minutes to treat 100 metres of solid lantana hedge
- About 45 minutes & 25 litres of 1:9 mix to treat 1 hectare of lantana
- Plus about 5 refills of a 5 litre backpack (not timed or costed)
- No refills with adapted 100 litre 4WD spray set-up
- Total Costs per Hectare = \$26.25 Labour + \$15.50 Herbicide = \$41.75

Splatter Gun with 9:1 Glyphosate is also registered for use with Groundsel Bush

Splatter Gun with Red Lantana



Splatter Gun for Bush Regeneration

Efficiency of Splatter Gun

Costs determined by terrain, access, personnel, methods & equipment

Creek's Bend Calibration Trial – Sample Plot = 25m X 100m

Assumptions & Conditions

Single operator using 1:9 mix

Moderately steep terrain with about 50% lantana cover

Labour @ \$35/hour (No travel, set-up or clean-up time included)

Refill time included for 4 X 5L packs

Glyphosate (360g/L) @ \$155 for 20L drum (No LPG, surfactant or dye)

Outcomes

1 hour & 20 litres of 9:1mix to treat ¼ hectare

Therefore, about 4 hours & 80 litres of mix to treat 1 hectare

Total Cost = \$140 labour + \$62 herbicide = \$202 per hectare

Follow-up Treatments with Splatter Gun



Splatter Gun for Bush Regeneration

Follow-up with Splatter Gun

Follow-up influenced by nature of area & surrounding forest

- Smaller area + vigorous forest + limited light = Little to no follow-up
- Medium size + less vigorous forest + more light = Treat at 6mth, 1yr & 2yr
- Large “sterile” areas + poor forest health = Treat at 6mth, 1yr, 2yr & 3yr

Suggested guidelines only

The timing of follow-up Splatter Gun treatments depends in large part on the nature of the treated area and the forest around it. Smaller patches of lantana, say up to 10m in diameter, can often be eliminated with one treatment when they exist as isolated pockets more or less surrounded by intact rainforest or wet sclerophyll type vegetation. The ready availability of seed and the reduced levels of light encourage rapid regrowth of natives and slows down any lantana seedlings.

Follow-up becomes more important when the treated areas are larger, the surrounding bush is less vital, and more light reaches the ground. When the treated lantana covers areas of say 20m or more in diameter, follow-up is probably going to be needed to remove lantana growing from seed, regardless of the nature of the surrounding forest.

It seems to us that the first follow-up should be about six months after the initial treatment. Lantana grows quickly, and it is a lot easier to kill when it is still a small six-month old plant.

Re-seeding and Re-planting

For larger treated areas it is a good idea to actively encourage regeneration by either disturbing the soil mechanically or with fire, or by distributing seeds of native plants and by planting seedlings. Grant Gibson has come up with some ideas about how you might re-seed large areas that have been cleared of lantana. As described by Fukuoka in his book *The One Straw Revolution*, you could distribute small pre-prepared "Seed Balls" that consist of native seeds embedded in a mixture of compost and clay. The clay protects the seed until there is enough rain to dissolve the clay, and the compost gives the seed a head start. Other ideas include broadcasting native seeds and planting seedlings that have either been grown specifically for the job or have been transplanted from nearby areas where there is an abundance of seedlings.

I would now like to discuss the "nuts and bolts" of the Splatter Gun method.

The Equipment

Modified Drench Gun

At first we used an old drench gun, with the drenching nozzle removed so that it acted like a large water pistol. This worked well and delivered a nicely confined jet with a good reach of maybe 8 to 10 metres. The drench gun would probably be the only equipment you would need to treat a few acres of lantana on your property. When we first started off the drench gun was a lot of fun to use, and we enjoyed killing lantana as fast as we could walk and pump the handle, but after an hour or two and hundreds of pumps your arm gets very tired.

The Phillips LPG powered forestry gun with lantana nozzle

We looked around for an alternative and found that the Australian company N.J. Phillips make an LPG powered forestry gun that would reduce the load on the operator's arm. When triggered, LPG gas propels a load of up to 50 mls about 8 to 10 metres. The original gas gun only came with a spray nozzle attachment, which is apparently used in banana plantations, but Phillips engineers developed a nozzle for us that delivered the herbicide in a confined stream.

Using the Phillips forestry gun with the lantana nozzle to deliver lines of 1:9 glyphosate mix represented a revolutionary breakthrough for bush regeneration work on Creek's Bend. For the first time a single operator, carrying portable, relatively inexpensive equipment, could effectively kill large areas of lantana in steep and otherwise inaccessible terrain while minimising collateral damage to desirable plants.

The operator can treat even the heaviest lantana thickets from a distance, as quickly as he can walk and pull the trigger. It becomes possible to almost surgically remove lantana while deliberately avoiding desired species caught up in the thicket. We and John Hunter have observed that many trees and shrubs react to collateral splatter by burning off the affected leaves, and do not die.

Unlike overspray, with Splatter Gun a reduced amount of chemical gets to the ground, and this spares many of the underlying native plants.

The LPG gas gun with the lantana nozzle was also fun to use, and this could be the only equipment you would need to treat say 100 acres of lantana infested forest. Later today when we visit Creek's Bend you will see large areas that have been treated by a single operator with this equipment.

However, when treating huge banks of lantana that infect entire ridge and valley systems, the regular refilling of the backpack container and changing gas bottles slows work down and increases the risk of spillage and other accidents.

Modified Portable Spray Units with 4-wheel drive or ATV

John Hunter told us about council workers who heard about Splatter Gun at one of his workshops and then modified spray units on their trucks to use splatter gun to treat kilometres of roadside lantana in a day. We thought about using Splatter Gun from a spray unit on the back of a quad bike or an ATV, but we ultimately bought a second hand Suzuki soft top 4WD for the job. The 4WD cost \$3,400 and the 100 litre spray unit cost about \$650.

The spray unit manufacturers told us that their standard nozzle adjusted right out was the best they could do to mimic the confined jet pattern of the modified Phillip's nozzle.

The standard nozzle works well enough on dense lantana, but it still gives off undesirable side-spray. We are experimenting with modifications to the nozzle, but we have yet to come up with the ideal setup.

We decided to use a 12m hose rather than the 8m length usually supplied with the unit. Apparently, the pump will handle a 20m hose without much pressure drop, but the issue for us was to balance the need to reach as far as possible with the ease of handling and storing the hose on the vehicle.

Using splatter gun from the 4WD 100 litre unit has been a great success. The vehicle is maneuverable and quite rugged and with Susan driving and me operating the Splatter Gun wand we have been able to quickly cover a lot of ground. It takes us about 2 hours to put out 100L of 9:1 mix treating both dense and individual plants over a considerable distance.

One feature of the 4WD unit is that it acts as a highly maneuverable filling station for the LPG Splatter Gun backpacks. Time and effort is saved because you can just unscrew the backpack bottle, stick in the wand and fill it with the pump. You can get twenty 5 litre refills from the 100 Litre tank. We usually take the LPG gas guns with us when we work with the 4WD unit, so we can get to hedges that we can not reach with the hose.

We have not used any equipment larger than our four-wheel-drive to deliver splatter gun, but we can see no reason why larger units could not be used from the back of trucks to treat certain banks of lantana.

The Herbicide Mix

John's father and his neighbours intuitively chose a 1 glyphosate to 4 water mix and decided to squirt the chemical in lines that wet only a minority of the plant. We discovered that a 1 glyphosate to 9 part water mix was registered for "low volume applications", such as with a "gas gun" or "splatter gun", with instructions to "apply an even spray to cover all foliage" in dosages of "2 x 2 ml doses per 0.5 m of bush height".

We continue to use the registered 1 glyphosate to 9 part water mix, but we need more research to determine whether this is really the best ratio for treating lantana when the chemical is applied in discrete lines.

I always assumed that registered herbicide mixes were the result of scientific research which had determined the best way to treat targeted weeds. But then John pointed out how very convenient it is that most herbicides come with recommended mixes such as 1:9, 1:19 or 1:29 that are so easy to use. For 1:9, just add 2 L to a 20 L drum and fill with water.

Certainly, the current 1:9 mix works well, but no one really knows whether the method would work just as well with a 1:10, 1:12, 1:15 or even a 1:20 mix. It is possible that the recommendations of the herbicide manufacturers do not represent the weakest effective concentration.

The question might not matter too much on smaller bush regeneration jobs, but the issue becomes very important when we want to remove lantana on a landscape scale. Even a reduction in the concentration from 1:9 to 1:10 would represent about a 10% saving in chemical costs and herbicide load on the environment. Our best recent purchase of glyphosate was \$155 for 20 L, but it has been as high as \$320 during the past year, so even a 10% saving amounts to a lot of money on big jobs.

It is important to note that the registered 9 water to 1 glyphosate ratio is for regular strength glyphosate, that is, 360 gms per litre, as found in such products as Roundup. Nowadays, many glyphosate products, such as Gladiator, Eradicator and CT, contain a stronger 450 gms of glyphosate per litre concentration. An even stronger product called Credit has 540 gms/L glyphosate and recommends 1:13 for splatter gun, which is about equivalent to 1:9 for the regular strength. Nonetheless, 450g/L products stick with the 1:9 mix.

When we use stronger products we adjust the mix to meet the 1:9 ratio for standard strength glyphosate. For instance, when using standard strength 360g/l glyphosate to make up a 20 L drum of 9:1 splatter gun mix, we pour in 2 L of glyphosate and add 18 L of water. When using the stronger 450g/l glyphosate products, to make up a 20 L drum of 9:1 splatter gun mix, we add 1.6 L of glyphosate to 18.4 L of water.

We add a surfactorant such as Protec to increase the stickiness of the mixture and to give some rain resistance. We also add coloured dye which makes it easier to keep track of which areas you have already treated.

Never use dam water to make up your mixture because glyphosate binds with clay and the clay particulates in the water will neutralise your mix.

Application Pattern

Early on we did some trials with the lines spaced 1, 2 and 3 meters apart, and our impression was that the best effect was at about 2 meter spacings, and this is how we go about the work. Again, more research is needed to determine the most effective and efficient Splatter Gun pattern of herbicide application.

When using Splatter Gun on large banks of lantana arch the line of herbicide over the top of the bush and down the front face and apply one line of splatter about every two strides, with an occasional horizontal pass low across the front edge of the bushes to treat any smaller plants. The effect is best when you treat actively growing plants with full foliage. In this region, provided the season is not too dry, you can treat lantana effectively during most times of the year.

With practice you will find that you can use Splatter Gun to carefully treat small lantana plants that are embedded in amongst other desired species. By lightly touching the trigger you can apply a few drops of chemical quite accurately.

Some Tips on Using Splatter Gun Techniques

Safety First

- It is essential that appropriate protective gear be worn at all times while preparing glyphosate herbicide and using Splatter Gun. Expect the unexpected. Always wear eye protection, and always be aware of the danger of accidental triggering of the chemical discharge.
- Carry water for washing and soap to manage any accidental spillage or contamination. Our first aid kit includes all the usual bits and pieces, plus pressure bandages for snakebites. We carry a Personal Distress Beacon with an inbuilt GPS when working in the bush. Models with GPS cost a bit more, but are vastly more accurate than models that do not have GPS.
- As with all herbicide work, avoid windy days because it does not take much of a breeze to break up the herbicide jet and increase unwanted side spray drift.

The N.J. Phillips Forestry Gas Gun with Lantana Nozzle

- Purchase additional LPG gas bottles. They cost about \$30 each. We take out four X 1 litre LPG gas bottles. When treating areas of dense lantana, the frequent firing of the gun tends to make the gas bottles freeze up, and this reduces pressure. With extra bottles on hand you can use a replacement bottle to maintain good working pressure, while the original cooled bottle warms up. Remember to stand bottles upright when they are not on the gun and carry them upright when traveling
- If you have more than a little lantana work to do it is a very good idea to become certified so that you can refill your LPG gas bottles yourself. It became obvious early on that filling LPG gas bottles at the local garage was going to be far too costly. I think we were being charged about \$3.50 per bottle, and they were never really empty when we took them in. To become a refiller you have to attend a training session run by a local LPG gas supplier and demonstrate that you have learned how to properly fill a gas bottle. The total cost for my training, certification and decanting equipment was about \$150. The decanting LPG cylinders cost about \$90 - \$100 each, and while I cannot give you an exact figure, they certainly fill many more bottles than \$90 would normally buy you from the garage. An added benefit is that you will never again run out of gas while you are having a barbecue.
- Use the 5 L rather than the 2.5 L backpack container. The 5L backpack is not too heavy to carry in difficult terrain, and cuts down on time spent refilling.

- Carry a repair kit that includes: Extra O rings for the regulator that screws into the gas bottles. Repeatedly taking bottles on and off can distort or break the “o” ring. Tools to repair split lines, including a knife, small screwdriver and extra radiator hose clips.
- If the gun starts to misfire, the problem is most often due to a piece of debris fouling the springs and valves that control the flow of chemical into and out of the chamber of the gas gun. To check the forward valve, un-screw the lantern nozzle and VERY carefully remove the small plastic valve and spring. It is easy to drop the valve and spring when you are wearing rubber gloves, and it is just about impossible to find these parts in the forest litter. You will find the rear valve and spring by screwing the fitting that connects to the chemical delivery pipe at the rear of the gun. When you are removing valves and springs take careful note of which way they came out so that you can put them back in the same way.
- Keep the seals on the LPG gas bottles lubricated and clean the equipment after every use. Finish up by flushing some surfactant oil through the gun to lubricate the interior seals.
- We use metal radiator clips to fix the hose to the gun and to the chemical container. This prevents the tube from being pulled off when you are working in heavy bush.
- You have an option of using either an upright or inverted delivery pack. The inverted bottle reduces problems with air sucking into the hose, but there is a risk of a major leak down your back and legs if the cap or hose comes loose. We always use the upright bottle option.
- When screwing the cap onto the bottle, backturn (turn counterclockwise) the cap 3-4 turns, to “wind up” the plastic tube as it were, so that when the cap is screwed on, the tube inside the pack is not twisted and sits straight down.
- The Phillips backpack carries one 5 litre bottle. We have experimented with bigger backpacks that carry two 5 L bottles plus a couple of LPG gas bottles. This decreased refilling time, but the 10 L load really is too heavy for working in steep country. It is easy to go head over heels off a log when you have 10 L on your back and one hand holding a gas gun.

Adapted Spray Unit with 4 Wheel Drive or ATV

- Be aware of wind direction so that any mist from the Splatter Gun blows away from the operator and the driver.
- When working on a dense hedge, turn the vehicle off to reduce exhaust pollution for both operators. The pump works well off the battery.

- We usually take the LPG gas gun equipment when we go out with the 4WD. This allows us to treat any lantana that we come across that is deeper in the bush than we can reach with the hose. You can save a lot of time by using the wand from the 100 litre unit to refill the LPG gas gun backpack.

Recycling

- Set up a recycling sink. When we wash up the water falls through a filtered funnel into an old 20 L glyphosate container. Our filter is an old pair of nylon tights stretched over the top of the funnel. This water can then be reused for future Splatter Gun work.
- If the recycled water has been sitting for more than a day or so, it is a good idea to filter it a second time as you pour it into the backpack for use that day. If left for any time, prepared herbicides with added chemicals such as surfactants and dyes tend to become gluggy and re-filtering is necessary.

Splatter Gun as a Means to an End

We want to use as little herbicide on our land as possible. We wish that there was an effective and practical non-chemical means for reversing the degradation that we see in the native forests all around us.

For us Splatter Gun is a means to an end, a tool that makes it possible for us to help our ailing native forests. Our hope is that we can break the cycle of decline so that the bush heals itself and becomes resistant to future attack by weeds and dieback.

To use a medical analogy, we see glyphosate as a treatment for an acute illness; a medicine that you discontinue as soon as the patient recovers. We do not see glyphosate as some sort of addicting drug which the bush will have to rely upon in order to survive into the long term future.

So, when we use splatter gun our goal is to remove the lantana that is disrupting forest structure and to keep lantana out of the bush until the canopy is repaired and native re-growth has filled in the old gaps.

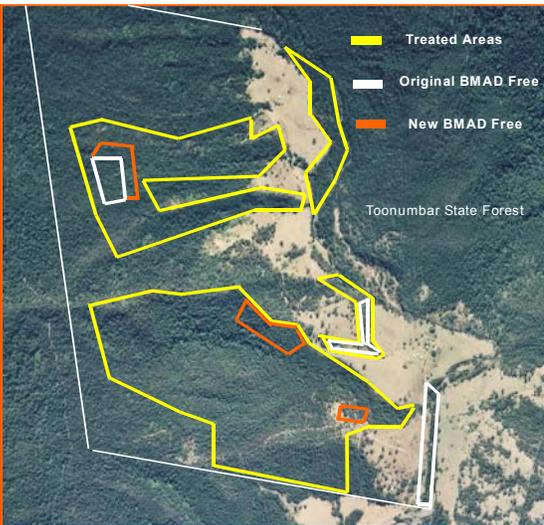


Splatter Gun for Bush Regeneration

Lantana Removal and BMAD

Splatter Gun & BMAD

- Observations
 - Creek's Bend
 - Sheepstation Creek
- Bird range & Edge effects
- Time scale of change
- Strategy – Join areas



Toonumbar State Forest

Planning Regeneration Programs with Splatter Gun

A bush regeneration plan sets out how we will address the task at hand. Success depends on how well our interventions counter the presenting problem.

I will break the planning process down into two parts: 1) Dimensions of the Task, and 2) Possible Interventions.



Planning Regeneration Programs With Splatter Gun

1. Dimensions of the Task

Nature and Location of area to be regenerated

- Terrain - Steepness and ease of working
- Available and potential access

Size of project

Nature, Age and Extent of lantana infestations

- Isolated plants Vs Hedges
- Initial invasion Vs Long established presence
- Lantana as a percentage of forest cover

Type, Size & Health of surrounding forests



Planning Regeneration Programs With Splatter Gun

2. Interventions – Your “Tool Kit”

Plan Your Attack

Preparing Access

Using previously treated margins & Opening access tracks

Availability of Resources

Labour, Finances, Machines, Time

Distributing Resources

Carrying in materials for work & Laying out drums

Removing Lantana

Manually, Tractor, Fire, Overspray, Splatter Gun techniques

Follow-up Treatments

Natural Regeneration Vs Assisted regen. Vs Reconstruction

How often and When – Keeping records

Re-seeding &/or Re-planting

Species selection, Ground disturbance, Seeding, Re-planting



Planning Regeneration Programs With Splatter Gun

CASE 3: The Toonumbar Valley National Parks & State Forests

Dimensions of the Task

- Multiple gullies & ridges
- Moderate to some steep terrain
- Areas of severe BMAD
- Areas of healthy forest
- Intact to badly disrupted structure
- Widespread, heavy lantana
- Threat to W.H. Murray Scrub R.F.
- Well maintained main roads
- Extensive network of old tracks
- Mixed potential for natural regen.



One Valley, Multiple Tenures

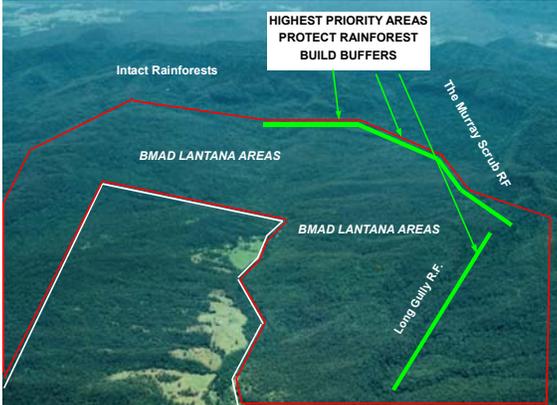


Planning Regeneration Programs With Splatter Gun

CASE 3: The Toonumbar Valley National Parks & State Forests

A Possible Plan of Attack

- Work out from rainforests
- Open network of old tracks
- Splatter - Trucks, 4WD & LPG
- 4WD Units treat & re-supply
- Fire treated areas for regen.
- Follow-up Splatter program
- Natural & Assisted regen.
- Some Reconstruction



One Valley, Multiple Tenures

The Big Picture – Carbon, Climate Change and Toonumbar’s World Heritage National Park and State Forests

Everything we do leaves some “carbon footprint”, and bush regeneration work is no different. I have to leave it to the scientists to work out the figures, but I hope that the carbon from the Splatter Gun’s LPG discharges and the exhaust from our 4WD are more than offset by the carbon sequestered by regenerating forests and the lessened danger of a fire storm that would release enormous amounts of carbon dioxide into the atmosphere.

I do not think that we can take forever to regenerate the World Heritage Toonumbar National Park and Toonumbar State Forests. Lantana, die-back, the inevitable catastrophic fire, and a diminishing number of seed bearing trees are danger signals that we can choose to ignore, or to heed.

It usually takes less effort to maintain an asset than it took to create the asset in the first place. Taking care of a paddock is a lot easier than making it.

What nature has given us in the Toonumbar National Park and State Forests is so immensely valuable that choosing to let it go, to not “follow-up” and maintain and protect it, makes no sense to us.

There is much to be gained by regenerating the Toonumbar National Park. I cannot come up with any accurate quote for the job, but I bet it would be less than half the top price paid for a Watego’s beach house in Byron Bay.

For such an investment we could develop effective and sustainable management programs for combating lantana, a Weed of National Significance, and we could demonstrate on a landscape scale solutions to Bell Miner Associated Dieback, a Key Threatening Process that threatens forests up and down the East Coast of Australia.

Of course, nature does not care if all that is left is camphor and lantana. We are the only losers. It's our choice alone.



Splatter Gun for Bush Regeneration Disclaimers & Disclosures

- Wayne & Susan Somerville are not professional bush regenerators.
- The information provided in this workshop & related materials:
 - Is of an educational & general nature only
 - Only reports on Wayne & Susan's bush regeneration experiences
 - Does not represent a recommendation for any course of action or situation
 - Does not represent a recommendation to use any bush regeneration technique
- All decisions concerning your land are entirely your responsibility.
- Anyone using herbicides must have the necessary training & accreditation.
- Always follow appropriate personal protection & safety procedures.
- Richmond Landcare Services & DECC are covering all workshop costs.
- Wayne & Susan are not receiving any payment for preparing or providing the workshop & associated materials. Nor are they receiving payment from any chemical producer, equipment manufacturer or any other individual or organisation for this workshop.
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