

Using Herbicides and Fire to Manage Pine Forests for Northern Bobwhites

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Northern bobwhite populations have declined over the past 30 years throughout their range. This decline is due to habitat loss caused by a combination of factors including changes in landscape use from small farms with brushy fence lines and hedgerows to clean-farming, silvicultural practices creating large monocultural stands, and more recently, reduction of fire as a silvicultural tool.

In Louisiana, bobwhites were historically abundant throughout pine forests maintained with frequent fires. Prescribed burning has been a traditional silvicultural practice.

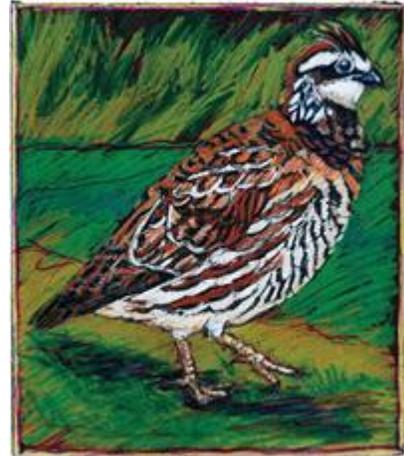


Illustration by Frankie Gould

Today, however, because of funding limitations, lack of qualified professionals and public perception of risk, prescribed burning is little used throughout the Southeast. Currently, wildlife managers can use prescribed fire only when conditions allow, often resulting in extended burning rotations that make it impossible to re-establish the native pine savannah that bobwhites prefer. Although herbicides have been used to improve habitat conditions for various wildlife species, little research has examined habitat quality for bobwhites within pine forests following application of selective herbicides, particularly in conjunction with prescribed fire.

LSU AgCenter researchers examined the effects of two herbicide treatments in conjunction with prescribed fire and prescribed fire alone on vegetative structure within pine stands. This research was conducted at the [Idlewild Research Station](#) near Clinton during 2000-2002.

The procedure involved an initial dormant season burn to nine 8-acre plots, then application of imazapyr and imazapyr with glyphosate to three plots each in September 2000. The remaining three plots served as controls. In February 2002, researchers conducted a second year post-treatment dormant-season burn in all plots to remove excess debris from experimental plots and for a two-year burn rotation for control plots. Two-year burning rotations are frequently recommended for managing bobwhite habitat in pine forests. Researchers sampled vegetation during the summer of 2000 (pretreatment) and during 2001 and 2002. The vegetation structure was evaluated for suitability for bobwhite nesting and brood-rearing.

Both herbicide treatments in combination with prescribed fire generally were more effective than prescribed fire alone at improving vegetation structure for brood-rearing and nesting bobwhites during the first year post-treatment. Both herbicides reduced vegetation height to levels (about 1 meter) conducive to bobwhite nesting and brood-rearing, reduced the percentage of woody and

hardwood midstory vegetation, and increased bobwhite food plants. Plant diversity and abundance of herbaceous vegetation, however, were reduced during the first growing season after treatment. Initially, both herbicide applications allowed for abundant pine seedlings in all herbicidetreated plots.

During the second growing season, both herbicide treatments in conjunction with fire were more effective than prescribed fire alone at improving vegetation structure for brood-rearing and nesting bobwhites. Imazapyr with fire was more effective at controlling woody vegetation while reducing litter depth relative to imazapyr-glyphosate with fire and fire alone. Bobwhite food plants were most abundant on imazapyr plots, and both herbicide applications with fire increased herbaceous vegetation needed for nesting and brood-rearing habitat. Imazapyr application with fire increased vines – honeysuckle, jessamine, blackberry, greenbriar and grape. Blackberry and grape are an important food source for bobwhites in spring, summer and fall. Notably, all treatments produced low percentages of bare ground (less than 10 percent), yet bare ground is an essential component for quality bobwhite habitat because it improves foraging success of adults and chicks. Landowners managing mature pine forests similar to those studied will have difficulty producing abundant bare ground because of needle cast and litter accumulation. Therefore, additional mechanical manipulations such as discing and tilling may be necessary.

Both herbicide treatments greatly reduced sweetgum, but neither negatively affected hard-mast producing species (those greater than 10 centimeters in diameter). Sweetgum are considered undesirable when managing pine forests for bobwhite, primarily because of their propensity to stump sprout following disturbance and their ability to outcompete desirable forbs and legumes. Conversely, mast-producing hardwoods are important for bobwhite, particularly during winter. Applying imazapyr and imazapyr with glyphosate likely will not affect the availability of mature, mast-producing species, although regeneration will be negatively affected through reductions in woody understory species.

Management Recommendations

Both herbicide treatments in combination with prescribed fire greatly improved brood-rearing and nesting habitat for bobwhites. Overall, imazapyr with fire provided a greater benefit than imazapyr-glyphosate with fire and retained a diversity of plant species. Prescribed burning historically has been used to manage and maintain pine and pinehardwood forest ecosystems, and fire typically increases production of native legumes used by bobwhites. Absence of disturbance in these forest ecosystems eventually will cause early successional pine-grasslands required by bobwhites to revert to thick hardwood midstory, which will become a closed pine-hardwood canopy with little herbaceous vegetation. Using herbicides and thinning the stands can help prevent these closed canopy conditions.

Although imazapyr improved vegetative characteristics for bobwhites more than prescribed burning alone, the greatest net benefit from imazapyr application occurred following the dormant-season fire before the second growing season. Landowners and managers interested in using imazapyr to benefit bobwhites should be cognizant of the continued importance of prescribed fire in managing landscapes for bobwhite.

Bobwhites require diverse, patchy habitat to successfully survive and reproduce; therefore,

widespread application of imazapyr in forested stands would not achieve this goal. Bobwhites prefer vegetation higher than 1 meter for escape cover, and only prescribed fire alone created and maintained cover suitable as escape cover. Therefore, the LSU AgCenter recommends that landowners and managers target areas where prescribed burns are not possible or areas where benefits of prescribed fire are low, such as areas where understory vegetation is too rank and dense to be controlled by fire alone, and apply imazapyr in conjunction with fire. Applying imazapyr to these stands will improve vegetative characteristics for bobwhite, and coupled with the continuation of prescribed fire when possible, will help create diverse, patchy habitat typically associated with greater numbers of bobwhites.

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