

# Small patches of fast-growing trees enhance forest structure on restored bottomlands



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## CONTEXT

In the Lower Mississippi Valley, over 120,000 hectares of agricultural land have been reforested in the last 10 years with a goal of reforesting 800,000 hectares (2,000,000 acres) by 2020.

## BACKGROUND

Despite the diversity of trees in bottomland forests, restoration on bottomland sites has most often emphasized planting relatively few species of slower-growing, hard-mast producing trees. Although successful at establishing trees, these young forests have slow development of vertical structure and are often depauperate in woody species.



## METHODS

I planted four patches of 12 eastern cottonwood (*Populus deltoides*) stem cuttings and four patches of 12 American sycamore (*Platanus occidentalis*) seedlings, on each of 40 reforested bottomland sites that were planted predominately with seedlings of oaks (*Quercus* spp.). Each treated site had an adjacent control where no additional trees were planted.

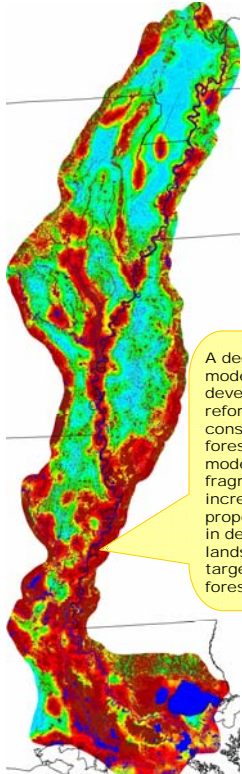
Each patch received 1 of 4 levels of weed protection (control, chemical, physical, or both). Survival varied between species and among levels of weed protection (Twedt and Wilson 2002). First-year survival of cottonwood (25%) and sycamore (47%) was poor, but 2nd-year survival of extant trees, 52% for cottonwood and 77% for sycamore, suggested enhanced vertical forest structure may result.

## RATIONALE

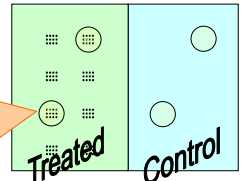
Because fast-growing, early-successional tree species provide rapid vertical structure, they attract colonizing forest birds. Additionally, they function as perches for frugivorous birds. Germination of seeds from deposition by these birds may increase woody species diversity surrounding these perches (Shiels and Walker 2003)



A decision support model has been developed to guide reforestation for conservation of forest birds. This model reduces forest fragmentation, increases the proportion of forest in deforested landscapes, and targets "high site" forest restoration.



A 0.1 acre (0.04 ha) evaluation plot, paired with a control plot, was obtained for every "patch" with at least 1 surviving tree



## EVALUATION

Of 320 total patches (40 sites x 8 patches), 165 patches had at least 1 surviving tree. Number and height of woody stems was obtained within 0.1 acre sample plots at every surviving patch and at an equal number of sample plots from paired control sites at each of the 36 sites with surviving trees (4 sites had no surviving trees). Number of species, total stem density, and maximum height of woody species (excluding vines) were compared between treated and control sites using ANOVA. Sites (n=36) were experimental units, whereas 0.1 acre sample plots (1 - 8 per site) were sampling units.

Table 1. Number of species, stem density, and maximum height of woody plants (excluding vines) on reforested sites with and without patches of fast-growing trees.

	Species / 0.04 ha	Stems / ha	Max. Height (m)
Control	4.3	888	2.9
Treated	5.9	1309	3.8
Treated (supplemental trees removed)	4.8	1171	3.3

## RESULTS

Sites with supplemental patches of trees had greater number of woody species ( $F=14.5$ ,  $P<0.01$ ), stem density ( $F=4.8$ ,  $P=0.04$ ), and maximum tree height ( $F=16.0$ ,  $P<0.01$ ) than was found on controls (Table 1). However, most of this increase was due to the presence of the supplemental trees. Even so, after accounting for trees planted within supplemental patches, treated sites had slightly greater stem density ( $F=2.30$ ,  $P=0.14$ ) and maximum tree height ( $F=2.9$ ,  $P=0.09$ ).

## THANKS

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## CONCLUSION

Patches of fast-growing trees on reforested bottomland sites contributed to increased species diversity, greater stem density, and increased vertical structure. Although significant vegetation differences were detected, it is unlikely that the differences exhibited 5-years after planting would result in differential use by bird communities.

