

# NEW RESEARCH CHALLENGES OLD LIMITATIONS

RESULTS SHOW  
CHOPPER® HERBICIDE  
PROVIDES EFFECTIVE  
CONTROL ON BEDDED SITES  
OVER A WIDE RANGE OF  
APPLICATION TIMINGS



Site preparation on Lower Coastal Plain pine plantations often includes a combination of bedding and herbicide treatment. Beds are important in this region because the water table is high and newly planted pine seedlings require non-saturated soil conditions to thrive. Herbicides are key to help control the waxy-leafed shrubs, deciduous trees, grasses and other herbaceous weeds that compete aggressively with planted pines. These site prep techniques have traditionally carried timing constraints, which can be difficult to comply with since bedding and herbicide timings are impacted by weather conditions and equipment availability.

Conventional herbicide application timing limitations are related to bedding.

“To allow adequate time for the herbicide to translocate throughout the plants prior to disturbance, herbicide applications were traditionally targeted for at least four weeks prior to bedding,” says researcher Harry Quicke. “After bedding, the conventional rule was to apply herbicides after the vegetation had fully re-sprouted since significant foliar uptake was considered to be essential for good long-term control of perennial species.”

In addition, site preparation herbicide applications have traditionally been targeted for late in the growing season.

“Historically, there were two main reasons for late-season herbicide application,” says Quicke. “First, studies indicated that both triclopyr and glyphosate provided poor control of woody shrubs when applied before July. Second, the prevailing consensus was that later season application of **Chopper® herbicide**, a soil active herbicide, would result in better residual control of herbaceous weeds during the first growing season.”

In 2001, BASF initiated a regional study to test these timing limitations. Dwight Lauer of Silvics Analytic and Harry Quicke of BASF Professional Vegetation Management conducted the research, in partnership with

Boise, Foley Timber and Land Company, Plum Creek Timber Company and Rayonier.

The study’s objective was to study pine growth and vegetation control following a wide range of **Chopper** application timings on operationally bedded sites. Results of the study indicate that not only are many of the historical timing restraints related to **Chopper** applications on bedded sites unnecessary, but that productivity gains are possible when applications are made earlier than has become customary in many areas.

## METHODS

Four study locations were selected to cover a range of soil conditions and vegetation complexes (Table 1). Two locations with sandy surface soils and gallberry and grasses as dominant species were planted with slash pine. Two locations with finer textured soils and a wide range of arborescent hardwood and shrub species were planted with loblolly pine. Each location was split with half receiving mid-season bedding and the other half receiving late-season bedding. Contractor availability and soil moisture levels determined bedding dates (Table 2). Mid-season bedding occurred between May 23 and July 25.

Late-season bedding occurred between September 25 and November 19.

The herbicide treatment was 48 oz/acre **Chopper** with 5 qts/acre modified seed oil applied at a total spray volume of 10 gal/acre. Garlon™ 4 was included at 1 or 2 pints per acre for control of blackberry (*Rubus spp.*). Up to nine application timings were replicated three times within each bedding regime at each location. Treatment plots were 60 ft long and covered two beds. Treatments were applied using a backpack pole sprayer equipped with a single KLC-9 nozzle. An untreated bed was included as buffer between treatment plots. Pines were planted the winter following application.

Herbaceous and woody vegetation cover was assessed in June the growing season after treatment. In June of the third growing season after treatment, diameter and height of all arborescent hardwood taller than 4.5 ft was assessed along with woody cover. Pine seedling groundline diameter and total height were measured at the end of the first and second growing season. Pine stem volume index was computed as the volume of a cone using groundline diameter and total height.

TABLE 1. DESCRIPTION OF STUDY SITES.

LOCATION	SOILS	MAJOR VEGETATION	PINE SPECIES
TENNILLE, FL	POORLY DRAINED SAND	GALLBERRY, BLACKBERRY, LOW PANIC GRASS	SLASH
YULEE, FL	VERY POORLY TO POORLY DRAINED SAND WITH CLAY LOAM SUBSOIL AT 2-3 FT	GALLBERRY, BROOMSEDGE, TALL PANIC GRASS (REDROOT ON EARLY BED REGIME)	SLASH
WHITEVILLE, NC	VERY POORLY DRAINED FINE SANDY LOAM/LOAMY SAND	RED MAPLE, SWEETGUM, MAGNOLIA, WHITE ALDER, WHITE TITI, FETTERBUSH, TALL PANIC GRASS, REDROOT	LOBLOLLY
OAKDALE, LA	POORLY TO MODERATELY WELL DRAINED SILT LOAM	SWEETGUM, TALLOWTREE, BEAUTYBERRY, ST. JOHN'S WORT, WAXMYRTLE, SUMAC, TALL PANIC GRASS, SEDGES, SWAMP SUNFLOWER, DOGFENNEL, MECARDONIA ACUMINATE	LOBLOLLY

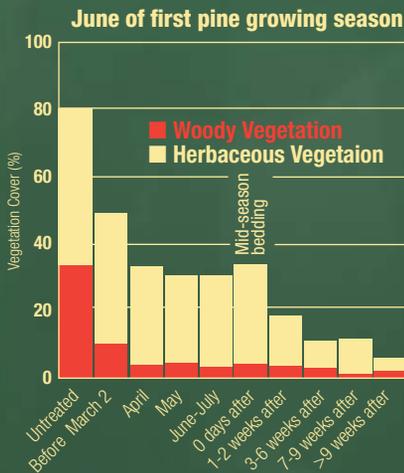
TABLE 2. BEDDING AND PINE PLANTING DATES.

LOCATION	MID-SEASON BED DATE	LATE-SEASON BED DATE	PLANTING DATE
TENNILLE, FL	5/23/01	11/1/01	2/1/02
YULEE, FL	6/7/01	11/19/01	12/14/01
WHITEVILLE, NC	6/22/01	10/23/01	2/11/02
OAKDALE, LA	7/25/01	9/27/01	1/14/02

## MID-SEASON BEDDING RESULTS

“With mid-season bedding, the reduction of woody cover was best for applications made after March and at least three weeks after bedding,” says Quicke (Fig. 1). “These treatments reduced woody cover from 36 percent following bedding alone to less than 5 percent. Herbaceous cover reduction was best for applications made at least one week after bedding. These treatments reduced herbaceous cover from 44 percent after bedding to less than 15 percent.”

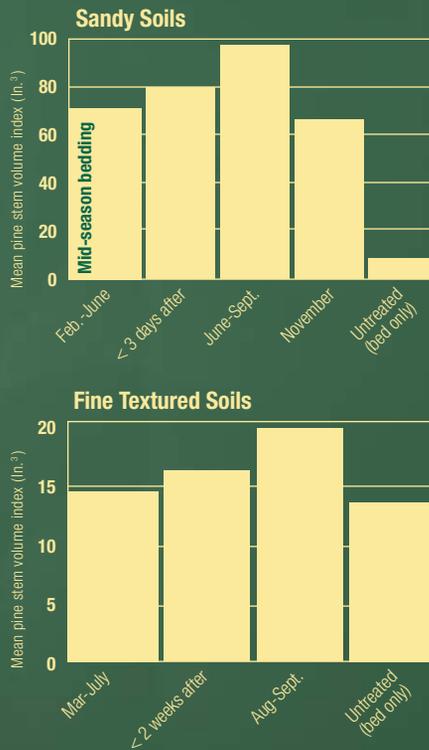
**Fig. 1** Vegetation cover in June of the first pine growing season following mid-season bedding. Data is the average of four locations.



Pine growth responded favorably to reduced vegetation and the timing of **Chopper**® herbicide treatment made a difference.

“The best pine growth occurred with **Chopper** applications made between June and September at least three days after bedding, which corresponds with the lower level of undesirable woody and herbaceous species on these plots during the first growing season,” says Quicke. “Lower pine growth following pre-bed applications reflects the higher herbaceous cover on these treatments. Pine growth from November treatments was less than earlier treatments despite good control of herbaceous and woody vegetation.” (Fig. 2)

**Fig. 2** Mean pine stem volume after two growing seasons on sandy soils (top) and fine textured soils (bottom) following mid-season bedding.

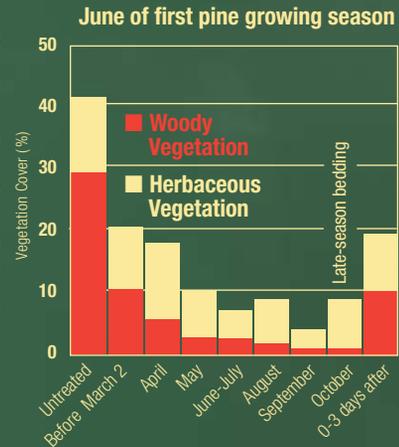


“The robustness of the **Chopper** treatments across a very wide timing interval is evident from the third-year hardwood assessments,” says Quicke. “Woody shrub cover was reduced from 50 percent in the bedded-only sites to 14 percent or less for any **Chopper** herbicide timing.”

## LATE-SEASON BEDDING RESULTS

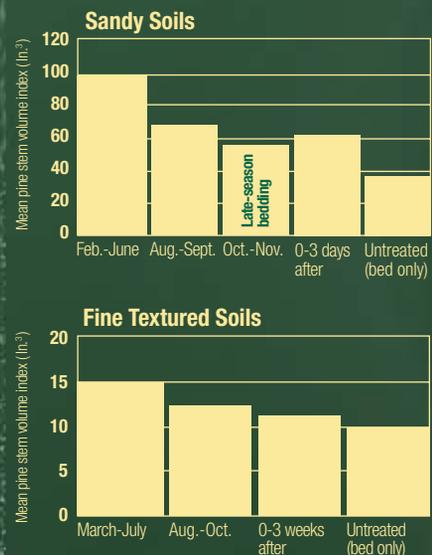
With late-season bedding, the reduction of woody cover was best for applications made after March and prior to bedding (Fig. 3). These treatments reduced woody cover from 29 percent following bedding alone to less than 6 percent. Post-bed applications were made less than a week after bedding and were not as successful as pre-bed treatments. Herbaceous cover was less than 14 percent for all treatments, including bedding alone; indicating late season bedding helps reduce herbaceous cover the year after bedding.

**Fig. 3** Vegetation cover in June of the first pine growing season following late-season bedding. Data is the average of four locations.



On sandy soils, slash pine growth was best for applications made from February through June (Fig. 4). After June, pine growth declined as application date was delayed from June through November. Loblolly pine on the finer textured soils followed the same trend with the best growth following early-season application through July and growth declining as application date was delayed after July. It is important to note that no post-plant herbaceous weed control treatments were used on these sites since the primary objective was to evaluate the impact of site preparation treatments alone.

**Fig. 4** Mean pine stem volume after two growing seasons on sandy soils (top) and fine textured soils (bottom) following late-season bedding.



“As with early-season bedding, **Chopper** treatments were successful across a wide timing interval on late-bedded sites, according to third-year hardwood assessments,” says Quicke. “Woody shrub cover was reduced from 42 percent in the bedded-only treatment to 12 percent or less for any **Chopper** application timing.”

## OVERALL RESULTS AND DISCUSSION

The study indicates that the historical timing restraints put on **Chopper** treatment applications for bedded sites are unnecessary. In addition, productivity gains are possible when applications are made earlier than traditional timing has dictated.

“After mid-season bedding, applications made from June through September resulted in the best pine growth,” says Quicke. “With late-season bedding, the best pine growth occurred when **Chopper** applications were made in February through July. This information provides forest managers an opportunity to move site preparation treatments outside the August through October window when application equipment is often fully utilized.”

An investigation of factors, other than the direct effects of the herbicide on vegetation, to explain the higher pine productivity following earlier season treatments was outside the scope of this study. However, Quicke notes that it is, nevertheless, interesting to speculate on potential reasons:

- *dead vegetation acts as a mulch and stops transpiring earlier, resulting in elevated soil moisture during planting*
- *prior to late-season bedding, vegetation has more time to decay, resulting in more uniform beds with less air pockets*
- *planting is better since the decayed vegetation provides less obstruction*
- *soil nutrient availability is positively changed to benefit the pines*

## CONCLUSIONS

None of the historical timing limitations were justified. **Chopper** herbicide in combination with modified seed oil provides effective vegetation control on bedded sites throughout a range of seasonal and bedding timings. **Chopper** can be applied as early as February and as late as November, up to the day before bedding and immediately after bedding.

For optimal vegetation control and pine growth, the following strategies are recommended:

### 1. MID-SEASON BEDDING

(May-July) – Make applications between June and September, at least 3 weeks after bedding. With this timing on sandy surface soils additional herbaceous weed control treatments may not be necessary. On finer textured soils additional herbaceous weed control is recommended – either add **SulfometuronMAX™** herbicide to the **Chopper** herbicide site preparation treatment or use post-plant herbaceous weed control. On all soil types make applications from February up to the day before bedding and follow with a post-plant herbaceous weed control treatment. If deciduous species such as blackberry and hardwood trees are targeted, delay application until these species have leafed out.

### 2. LATE-SEASON BEDDING

(September-November) – Make applications from February through July. If deciduous species such as blackberry and hardwood trees are targeted, delay application until these species have leafed out. With this timing on sandy surface soils

additional herbaceous weed control treatments may not be necessary. On finer textured soils, post-plant herbaceous weed control is recommended.

“It should be emphasized that any timing provided long-term hardwood control and resulted in sizable pine growth responses compared to bedding alone,” says Quicke. “This provides the maximum flexibility under operational constraints where optimal timings are not always possible.”

Bottom line results revealed that **Chopper** - when applied as early as February or as late as November - can provide robust, long-term control of unwanted vegetation that results in sizable pine growth responses compared to bedding alone.

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APN 05-15-002-0073 SPRING REPRINT

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