

## *Spot Application of Diammonium Phosphate and Poultry Litter at Establishment in an Old-Field Planted Loblolly Pine Plantation*

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### ABSTRACT

A study area was installed in Quitman County, Georgia to determine benefits of diammonium phosphate (DAP) and poultry litter spot application to planted loblolly pine (*Pinus taeda* L.) on a fertile old-field site. Experimental design was complete block with three replications per treatment. Treatments consisted of applications of DAP and poultry litter with and without herbicides separated by row buffers. At the time of treatment, neither ground-line diameters nor soil fertility levels were significantly different. Two year survival ranged from 77% in poultry litter treatments to 92% in DAP treatments. Two year averages for ground-line diameters and heights for the herbicide only treatment were significantly greater than other treatments with the exception of the poultry litter plus herbicide treatment. Spot application of DAP or poultry litter to newly planted loblolly pines were not cost beneficial in this case (a very fertile old-field site). If application of DAP or poultry litter are made then weed management should be included as part of a total management plan.

### METHODS AND MATERIALS

Loblolly pine seedlings were planted in an old-field site (previous crop – peanuts) in December, 1999. Soils present were Troup and Bonneau. Experimental design was complete block with three replications per treatment. Individual plots consisted of two rows of twenty living seedlings at time of treatments. Two rows of untreated buffer seedlings were between each plot. Treatments were: (1) control = no treatment, (2) surface application of DAP @ 8 grams/tree = (190 lbs/acre) and (3) surface application of poultry litter @ 125 grams/tree = (1.5 tons/acre) in four square foot grids around each seedling on 7 April 2000, herbicide only banded Oust @ 3 oz/acre + Atrazine @ 5pts/acre over the seedlings on 15 May 2000, (5) DAP + herbicide and (6) poultry litter + herbicide.

### RESULTS

Two year survival (Figure 1) ranged from 77% (poultry litter) to 92% (DAP). Two year ground-line diameter (GLD Figure 2) and height increment (Figure 3) for the herbicide only treatment was significantly greater than the DAP + herbicide, DAP only, control, and poultry litter only but not significantly different than the poultry litter + herbicide treatment. Two year volume index ( $GLD^2 \times HT$ ; Figure 4) followed the same trend as GLD and height increment but the herbicide only treatment was significantly greater than all other treatments for volume index. Two year growth increment general order of treatments was as follows (descending order): herbicide only, poultry litter + herbicide = DAP + herbicide, DAP = Control, and poultry litter. Two year incremental growth (GLD, total height, and volume index) results illustrate that there were no

statistically significant benefits to adding DAP or poultry litter to the micro-site around each seedling above the herbicide treatment on this relatively fertile old-field site.

## CONCLUSIONS

These research data suggests controlling competitive vegetation is more beneficial than spot application of diammonium phosphate or poultry litter to loblolly seedlings at establishment on old-field sites with high fertility. Application of a fertilizer treatment alone will increase competitive vegetation and as a result decrease seedling survival, (Figure 1). If a landowner chooses to fertilize seedlings at establishment then controlling the resulting unwanted vegetation must be considered to minimize competition.

Table 1. Surface soil (0-6") nutrient and pH status prior to treatment (2000) and two years post treatment (2002).

Treatment	Phosphorus		Potassium		Calcium		Magnesium		Zinc		Manganese		pH	
	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002
-----lbs acre <sup>-1</sup> -----														
P	45	40	89	68	692	524	33	38	27	20	27	27	6.3	6.3
PH	45	43	81	68	659	566	30	30	20	20	27	33	6.4	6.3
C	55	43	96	75	600	436	30	35	27	20	28	31	6.2	6.3
H	56	48	85	67	516	392	32	32	27	23	25	32	6.2	6.2
DAP	51	44	101	74	736	475	38	35	27	20	27	30	6.3	6.4
DAP+H	41	38	91	56	522	396	33	26	20	20	25	33	6.3	6.3

P=Poultry litter application at 1.5 tons acre<sup>-1</sup> equivalent

PH=Poultry litter application and herbicide application

C=Control

H=Herbicide application of 3oz Oust + 2.5qts Atrazine acre<sup>-1</sup>

DAP=Diammonium phosphate application at 190 lbs acre<sup>-1</sup> equivalent

DAP+H=Diammonium phosphate application and herbicide application

No significant differences existed between treatments for pre-application or two year post-application nutrient level or pH (DMRP 5% alpha level)

Table 2. Loblolly pine foliar nutrient concentrations at the end of the first (2001) and second (2002) growing seasons after treatment

Treatment	Nitrogen		Phosphorus		Potassium		Calcium		Magnesium		Sulfur	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
-----%-----												
P	2.00	1.52	0.16	0.13	0.44	0.46	0.41	0.28	0.05	0.06	0.19b*	0.15
PH	1.93	1.47	0.15	0.14	0.42	0.45	0.44	0.26	0.05	0.05	0.18b	0.15
C	2.11	1.59	0.15	0.13	0.41	0.43	0.33	0.27	0.05	0.05	0.19b	0.15
H	2.00	1.56	0.16	0.12	0.44	0.44	0.37	0.25	0.06	0.05	0.20ab	0.14
DAP	2.21	1.57	0.16	0.12	0.44	0.39	0.36	0.24	0.05	0.05	0.22a	0.15
DAP+H	2.07	1.57	0.16	0.14	0.43	0.45	0.42	0.27	0.05	0.05	0.20ab	0.14

\* Values in the same column followed by a different letter are significantly different at the 0.05 probability level by duncans multiple range test.

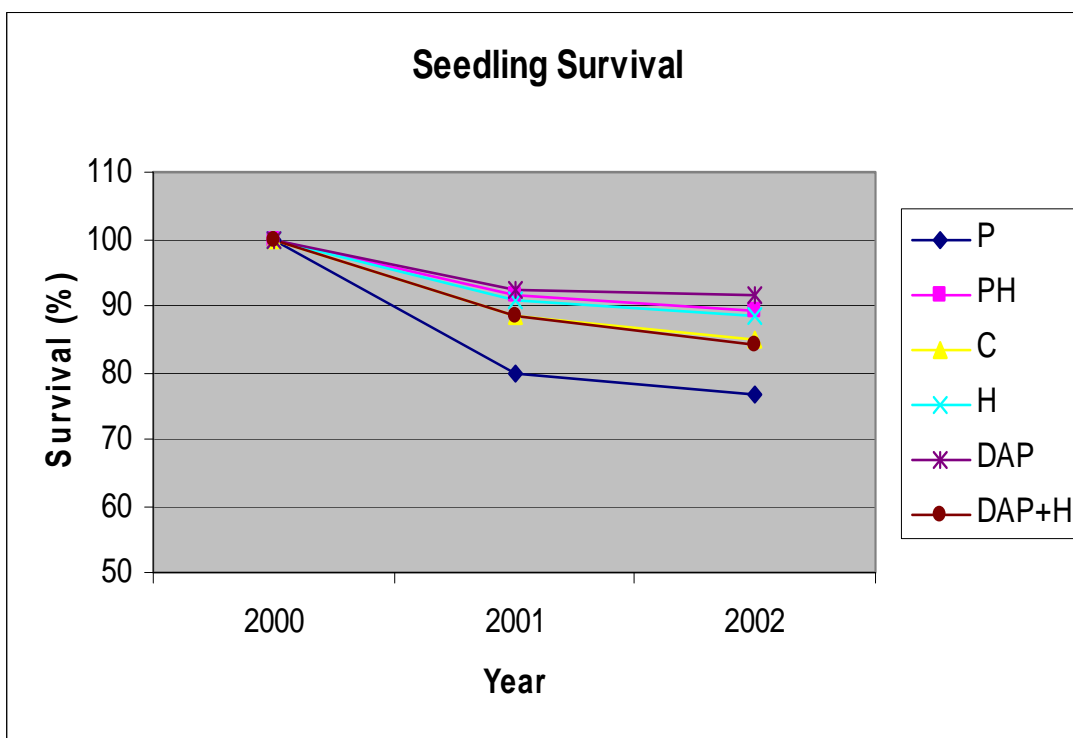


Figure 1. Old-field loblolly pine survival one and two years after treatment on well drained soils (Troup and Bonneau) in Quitman County, Georgia.

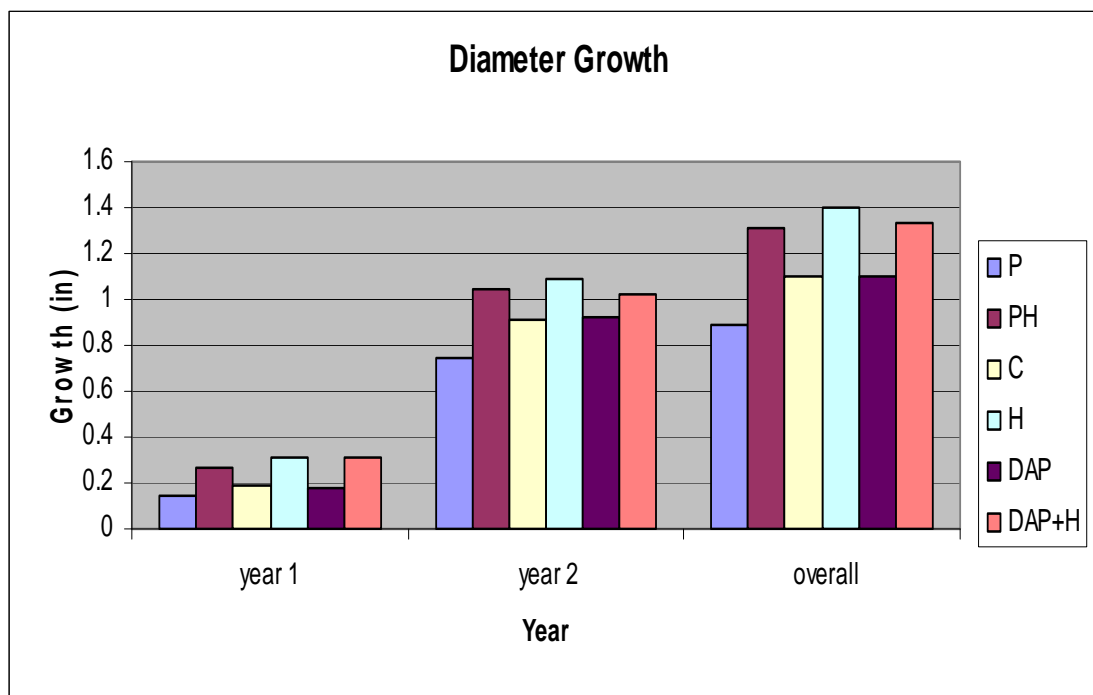


Figure 2. Old-field loblolly pine groundline diameter growth one, two years, and cumulative after treatment on well drained soils (Troup and Bonneau) in Quitman County, Georgia.

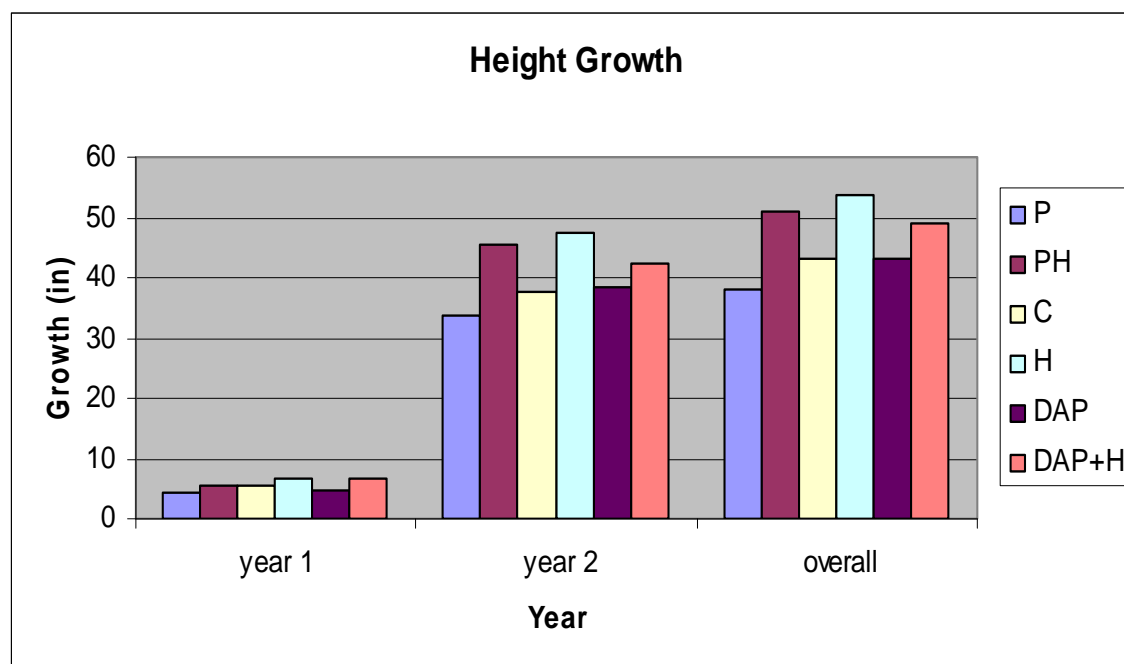


Figure 3. Old-field loblolly pine height growth one, two years, and cumulative after treatment on well drained soils (Troup and Bonneau) in Quitman County, Georgia.

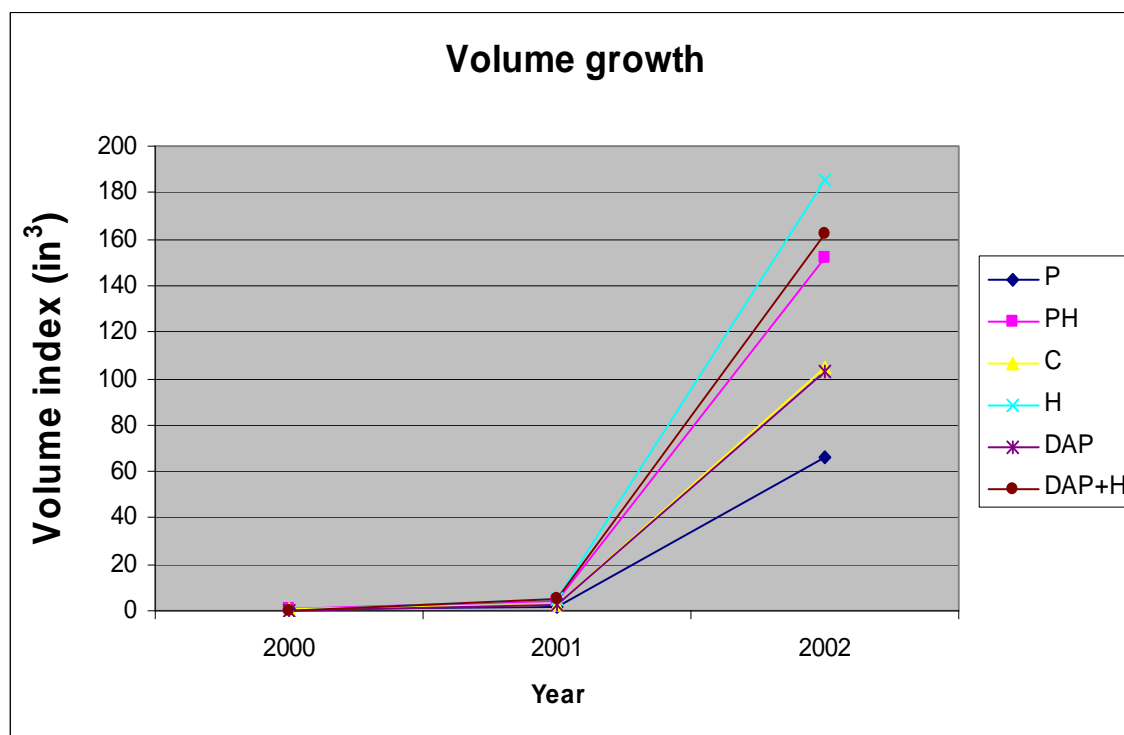


Figure 4. Old-field loblolly pine volume index one, two years, and cumulative after treatment on well drained soils (Troup and Bonneau) in Quitman County, Georgia.



Photos 1 and 2. Control (left photo) and herbicide only (right photo) old-field loblolly pine (Troup and Bonneau soils) two years after treatment.



Photos 3 and 4. Poultry litter (left photo) and diammonium phosphate (DAP; 18-46-0) old-field loblolly pine (Troup and Bonneau soils) two years after treatment.



Photos 5 and 6. Poultry litter + herbicide (left photo) and diammonium phosphate + herbicide old-field loblolly pine (Troup and Bonneau soils) two years after treatment.

## ABOUT THE AUTHORS

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**CITATION**

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