Predicting Cattle Damage in First-Year Loblolly Pine Plantations

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Highlight: Pine damage and survival were correlated with forage utilization. Damage can be predicted from forage utilization but survival is affected by many other factors and cannot be predicted precisely. A regression is presented which will allow a range manager to predict the amount of pine damage to expect in first-year loblolly pine plantations from forage utilization data.

The demand for grazing forest range ecosystems is predicted to increase 50% by the year 2000 (Forest Range Task Force 1972). Increased open range grazing in Arkansas and Oklahoma has already created problems with even-aged loblolly pine regeneration. The need for forage in these states and a history of open range grazing make it necessary to determine the compatibility of grazing with intensive pine management. In the longleaf-slash pine range there is considerable knowledge about forest range grazing and its impact on pine survival and growth (Boyer 1967, Pearson et al. 1971, and Hughes 1976). Grazing capacities in the loblolly shortleaf pine range have not been precisely determined (Wolters and Wilhite 1974).

Pearson et al. (1971) found that light and moderate grazing (33 and 47% forage utilization) did not affect planted or sowed slash pine during their first 5 years. Heavy grazing (56% forest utilization) did, however, reduce first-year survival. Boyer (1958) found that first-year survival of naturally seeded longleaf pine was unaffected by moderate grazing, but after 5 years of grazing both survival and growth were reduced (Boyer 1967). Pine mortality and growth varied directly with forage utilization.

In this study pine damage and survival were correlated with forage utilization on intensively prepared sites of first-year, loblolly pine plantations. An equation is presented which predicts damage and survival from forage utilization. With it a range manager can determine an acceptable cattle stocking level for first-year plantations. Whether or not this stocking level is being exceeded can also be estimated with forage utilization sampling.

Method

Eight plantations, between 80 and 160 ha in size, were selected for study. Site preparation was conducted in the summer and fall of 1974 and varied from aerial herbicide spraying with subsequent broadcast burning to scalping with a special dozer blade followed by piling and burning of debris. One-year-old loblolly pine seedlings were planted during the 1974-75 winter. All plantations were in the annual weed stage of plant succession during their first growing season. Four sets of 20 by 20 m paired plots were randomly located on each plantation, and one plot of each pair was fenced shortly after planting to exclude free-ranging cattle which graze the area year round. Number of surviving trees, as determined on 262.4 m² circular subplots just after study establishment, ranged from 568 to 1,581 per hectare. At the end of the first growing season the plots were again visited to determine numbers of undamaged trees as well as number of trees damaged by browsing and trampling. In July of the same year all green and dry aboveground biomass was clipped and weighed from three randomly located square-meter subplots within each major plot. Forage utilization was measured as the difference between biomass on the ungrazed and grazed subplots.

Results and Discussion

Regressions were computed to predict change in percent survival...
A Simple Method of Converting Rangeland Drills to Experimental Plot Seeders

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Highlight: Rangeland drills can be converted to experimental plot drills by mounting a cone seeder and a spinner divider over the seed box. The cone seeder feeds a uniform amount of seed over the length of a plot and the spinner divider splits the seed into fractions with each fraction going to a different planting unit of the drill. Only one packet containing the amount of pure live seed to plant a plot is needed. Converted drills are self-cleaning. Numerous forage species can be seeded in contiguous plots without modifying or recalibrating the planter.

Seeding rangelands and other sites to improved grasses and legumes often requires drills designed specifically for that purpose. Rangeland drills have been developed that are capable of seeding light, chaffy seeds into poorly prepared seedbeds on rugged terrain. New power tillage drills are capable of seeding directly into rain. New power tillage drills are capable of seeding directly into rain. Most rangeland drills have suitable seeding mechanisms. Only one packet containing the amount of pure live seed to plant a plot is needed. Converted drills are self-cleaning. Numerous forage species can be seeded in contiguous plots without modifying or recalibrating the planter.

Using unmodified rangeland drills for seeding experimental plots presents many problems. Large quantities of seed are needed to fill seed boxes to the level necessary to obtain uniform rates of seeding. Experimental varieties are usually available only in small quantities. Increasing seed lots to the quantities needed can delay initial evaluation several years. Unmodified drills must be emptied and cleaned between contiguous plots. Extensive recalibration of drills is often required because several species and mixtures may be in the same experiment. Ideally, the drill should be recalibrated for seed lots differing in percentage of pure live seed.

Numerous plot drills have been developed for seeding agronomic trials. Most are unsuitable for use in rangeland trials because they cannot seed chaffy grass seed or they cannot be used in rangeland seedbeds. Many agronomic plot drills have desirable features that can be used on rangeland drills. The three main components of a plot drill are the seed feeding mechanism, seed dividing mechanism, and the seeding mechanism. Most rangeland drills have suitable seeding mechanisms. Only one packet containing the amount of pure live seed to plant a plot is needed. Converted drills are self-cleaning. Numerous forage species can be seeded in contiguous plots without modifying or recalibrating the planter.

Feeding mechanisms are used to feed a uniform amount of seed over the entire length of a plot. Feeding mechanisms most commonly used on plot drills are slotted, revolving belts (Frey and Downs 1950; Patterson, et al. 1957) and rotating cones (Barker, et al. 1976; Beard and Freeman 1960; Berg 1958; Marshall 1972; Oiyjord 1963; and Schmidt 1971). Belts or cones are gear driven by planters or packer wheels and are geared so that one complete revolution of a cone or one-half revolution of a belt occurs when the planter moves the length of a plot. As the belt moves forward and the cone rotates, seed is dumped into a seed divider or directly into seeding tubes. At the end of a plot, the self-cleaning belts or cones are empty and can be filled with seed for planting the next plot. Only the amount of pure live seed necessary to seed a plot is placed on a belt or in a cone, which simplifies calibration and keeps to a minimum the amount of seed needed. Cones are more compact and easier to feed than belts and it is easier to shield them from wind.

Seed dividers are used to split the seed into fractions with each fraction going to a separate planting unit, i.e., disk openers, hoes, or shoes. They make it possible to seed one plot with one packet of seed. This greatly reduces the labor involved in seed packaging in comparison to drills (Beard and Freeman 1960; and Berg 1958) that have no dividers but use a separate cone for each planting unit. Agronomic plot drills use various methods of dividing seed in this plant community and in order to achieve it cattle may have to travel extensively in search of palatable plants. Pearson et al. (1971) found that only heavy grazing (57% forage use) reduced first-year survival in slash pine, but the seedlings were planted on a climax bluestem grass community. The amount of damage one might expect in first-year plantations is not only related to the number of cattle and percent forage use but also the stage of plant succession and the amount of good forage available. An increase in the amount of palatable forage might be expected to reduce cattle damage to pine plantations and lower the slope of the regression presented.

Literature Cited


