Seedling Survival Count

Guideline

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PREAMBLE

Public sectors, private individuals and communities plant trees for diff erent purposes. The public sectors and communities plant seedlings for reforestation or aff orestation of degraded landscape for commercial purpose (log, construction materials and firewood production) or restoration of degraded landscape to mitigate climate change and improve soil health while individuals mostly do it for commercial purposes. Whatever be the purpose, all expect high survival rate of planted seedlings because tree planting needs high investment (seed collection, seedling raising, pitting, planting, weeding and other management costs such as guarding). Hence, planted seedlings with such high investment should grow to stand with trees of desired size and quality and density. In the contrary, most of the time, poor survival rate is recorded due to diff erent factors. These factors should be identified through survival count so that action items are designed for either beating up or replacement based on the survival rate. Survival rate above 80% indicates healthy performance of planted seedlings and need only protection and other

management actions for fast growth and better quality. If survival rate is below 80%, it needs either beating up or replanting. This is where management decision is required.

Survival and growth of tree species vary considerably, some tree species are environment sensitive, some are light demanding, while others are shade tolerant. Hence, it is very important to know where to plant what species. There is also survival difference between relatively short seedlings compared to relatively tall seedlings.

The objective of this guideline is to support field staff and local partners with technical methods of survival count that will help checking the survival rate of planted seedlings to support decision makers for appropriate action.

WHAT IS SURVIVAL COUNT?

Survival count is checking the existence of planted seedlings in the field. It is natural that some planted tree seedlings die while other survive well. This could be because of different factors such as quality of seedlings planted, poor seedling handling, lack of technical knowledge and seedling damage during transport. During survival count, one has to take note of seedlings alive, dead or missed so that survival percent is calculated to help decision makers to take action in the coming planting season. Survival is difficult to estimate by simply looking at plantation as looking at every seedling planted would be extremely time consuming. To overcome such problem, foresters should count survival of a portion of the planted seedlings by sampling and calculate survival rate.

PURPOSES OF SURVIVAL COUNT

Survival count of planted seedlings serves diff erent purposes. Some of them are:

- Evaluate planting success to help the landowner determine replanting needs

- Give the forester the opportunity to take a closer look at on-the-ground accomplishments to improve the quality of planting materials and other factors contributing to survival

- Provide feedback to the organization for decision making on what to plant (quality seedlings, time of planting, planting technique etc) to improve survival

- Help identity problems with particular species or other factors related to tree planting to improve out-planting success

HOW TO CONDUCT SURVIVAL COUNT

Survival Count for Row Planting

Seedling survival count is conducted twice during the first planting year, one at the end of rainy season and the second at the end of dry period. The one at the end of the rainy season helps to check seedling quality, planting technique and handling, while surveys done at the end of dry period may reflect the influence of weather conditions during the growing season. Survival count is conducted either by total count for small size area or by taking samples for large area. Sampling is based on the arrangement of the planting spots, planting in row and planting without row. For planting in rows, where the planted area is less than 2 hectares, one should sample every 5th row and for areas of above 2 hectares, the sample should be every 10th row.The survey should start at one randomly selected edge of the planting area and goes to the end of the row and repeated at every "nth" row based on size of the area. For each tree or planting spot, record species and whether the tree is alive, dead or missing along the entire rows.

Survival Count for Seedlings Planted Without row

In case of plantation where seedlings are not planted in rows (planting is with no defined layout), the survival count is conducted by taking randomly distributed circular sample plots in the plantation

area. In this case, the sample size for survival count is approximately 10 percent of all seedlings planted in a respective planting area. The critical factor is to make the samples representative of the planted area as a whole. For small planting areas, 100% tally may be possible. Otherwise, plots of 10m^2 with plot radius 3.14 meter is recommended. This may have some variation with a scientific research sample size determination. However, it will give good approximate results if 15 sample plots are assessed from an area of 10-25 ha. For plantation with area 10 – 60 hectares, 30 plots are recommended. Plots must be representative of the planted areas and should be randomly distributed across the entire plantation. Accordingly, in each plot, record the species and whether each planting spot contains a live tree, a dead tree or tree missing. Use the table below (annex 2) for recording.

Survival count for plantation With Different Species

If the plantation consists of more than one species, survival count should be checked species-wise. That means, the record table should include this so that the existing, dead or missed seedling species is recorded. This together with information on how many seedlings were planted of each species (noted on the plantation history form during distribution), will make it possible to get a good idea of the survival of the different species (see annex 1).

If the survival rate is more than 80%, there is no need for replacement planting. However, for survival rate below 80%, replacement planting is needed to improve the stock and proper land use.

SURVIVAL COUNT RECORDING

Regardless of the survey method used, data collected in the field should be recorded using standard forest inventory nomenclature, tally and summarized on the Seedling Survival Survey Form (annexes1 and 2). Surveyors should also record his/her observation on the condition of the seedlings. If damaged, write cause, animal, insect or any observation of the cause for damage. This may help owner to take appropriate actions related to the identified problems.

TIMING OF SURVIVAL COUNT

Survival count may take place in two seasons. The first is after end of rainy season, mostly in the month of October that may indicate quality of planted seedling, planting techniques or seedling handling during planting. The second is end of dry season, mainly in the month of March/April that reflects the influence of weather conditions during the growing season. The value of a follow up check in the dry period is to confirm survival over the dry period and assess which tree species survived the dry season and this will help foresters to focus on those best performed tree species for next planting.

CALCULATING SURVIVAL RATE OF PLANTED SEEDLINGS

Survival rate is the percent of living tree seedlings against total tree seedlings planted. After summarizing field data (dead, living and missed) from the record sheet, survival rate is calculated by adding number of living seedlings and divide by the total number of seedlings planted multiplied by hundred. This will help decision makers to plan for action. The following formula is applied in calculating the survival rate.

$$\text{Survival rate} = \frac{\text{Number of Lving seedlings}}{\text{Number of total seedlimgs (spots) in the sample}}$$

Annex 1:parallel lines plot data recording form

Table 1: Form for tally living, dead or missed seedling and type of species separately

Row number	Species name	Planted Seedling			Survival %	Average height	Observation (damage type, by animal, dry from root, planting problem etc)
		Alive	Dead	Missed			

Comments _____

Survey approved by _____

Name of surveyor _____

Date _____

Date of survey _____

Signature _____

Signature _____

Annex 2 Circular plot data recording form
Table 2: Format for recording data from circular plots

plot number	Species name	Planted Seedling			Survival %	Average height	Observation (general conclusion)
		Living	Dead	Missed			

Comments/recommendation _____

Name of surveyor _____ Survey approved by _____

Date of survey _____ Date _____

Signature _____ Signature _____

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