Effects of Planting Techniques on Seedling Establishment in Native Species for Sustainable Revegetation

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Hot summer (50 ^{o} C)

Occasional rain

Rate of evaporation exceeds precipitation

Soil erosion by wind

Grazing

Soil compaction

Salinization

Natural recruitment of seedlings- very slow

High mortality in initial stages of growth

Varies with species , planting technique used

Additional efforts for revegetation

Major Planting Techniques

Direct seeding

- Sowing seeds directly into prepared soil
- With or without pretreatment
- Cost effective method
- Seed drills can be used
- **Depth of sowing**, **Seed rate** can be adjusted

Broadcasting

- Seeds **scattered** across area
- Either by mechanical means or by hand

Transplanting

- Planting of established **seedling**
- Time consuming
- Expensive

Objective

To evaluate and compare **the survival rate and performance** of direct-seeded and transplanted *Rhanterium epapposum* and *Haloxylon salicornicum* plants grown under field conditions.

Methodology

~~At KISR's Station for Research~~ and Innovation (**KSRI**), Kabd

Species:

Rhanterium epapposum

Haloxylon salicornicum

Treatments:

Primed

non-primed seeds

transplanted seedlings

What is seed priming?

- A **physiological seed enhancement** technique.
- Increases **germination rate, uniformity** and growth under stress.
- Involves **seed soaking** in a priming agent which is followed by **drying** to initiate germination process without radicle emergence.

Methodology

- The primed (hydro priming)or non-primed seeds of sown manually at a depth of 5-10 cm
- Capitullum of *Rhanterium epapposum* hydro-primed for 12 hours followed by surface drying.
- *Haloxylon salicornicum* seeds were hydro-primed for 6 hours
- Control seeds were directly sown in the field without priming.

Methodology

Details	*Rhanterium epapposum*	*Haloxylon salicornicum*
Seed filling	100%	95%
Viability	90%	72%
Hydro priming-Duration	12 hrs	6 hrs
Seed rate	0.5 g (10 Capitullum)	1.5 g (105 seeds)
Plant spacing	2 x 2 m	2 x 2 m

- Sowing: First Week of March 2016
- Survival percentage
- Plant growth parameters (plant height, number of branches, and root collar diameter)
- Data for the first year presented

Rhanterium epapposum

Direct Sowing- March, 2016

February, 2017

Primed- February, 2017

Non Primed- February, 2017

Rhanterium epapposum

Transplanted- March, 2016

Transplanted- February, 2017

Haloxylon salicornicum

Direct Sowing- March, 2016

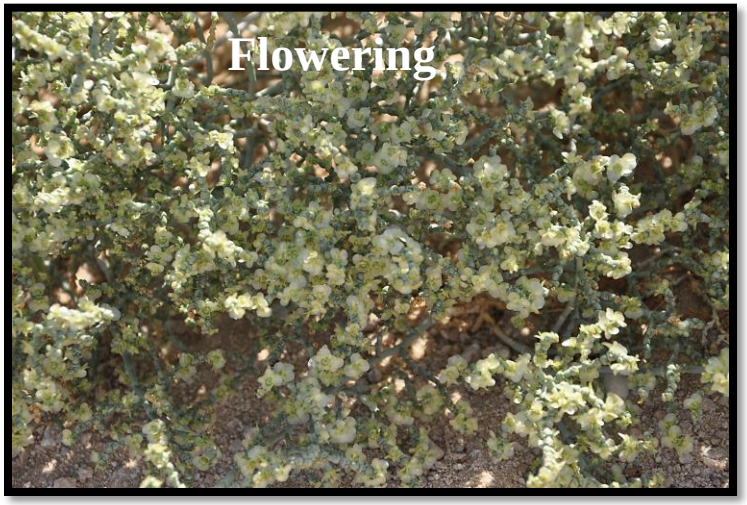
June, 2016

April, 2017

Haloxylon salicornicum

Transplanted- March, 2016

November, 2016

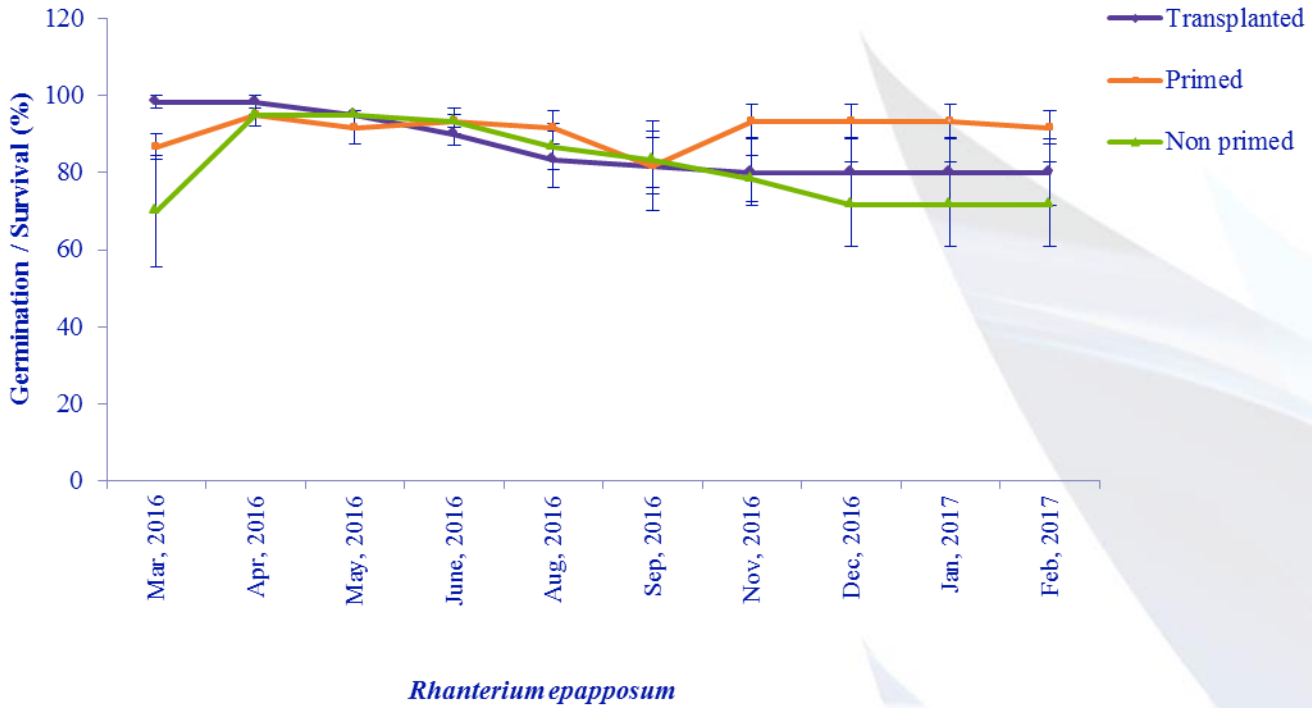


Haloxylon salicornicum- Comparison

Transplanted- March, 2017

Direct sown- March, 2017

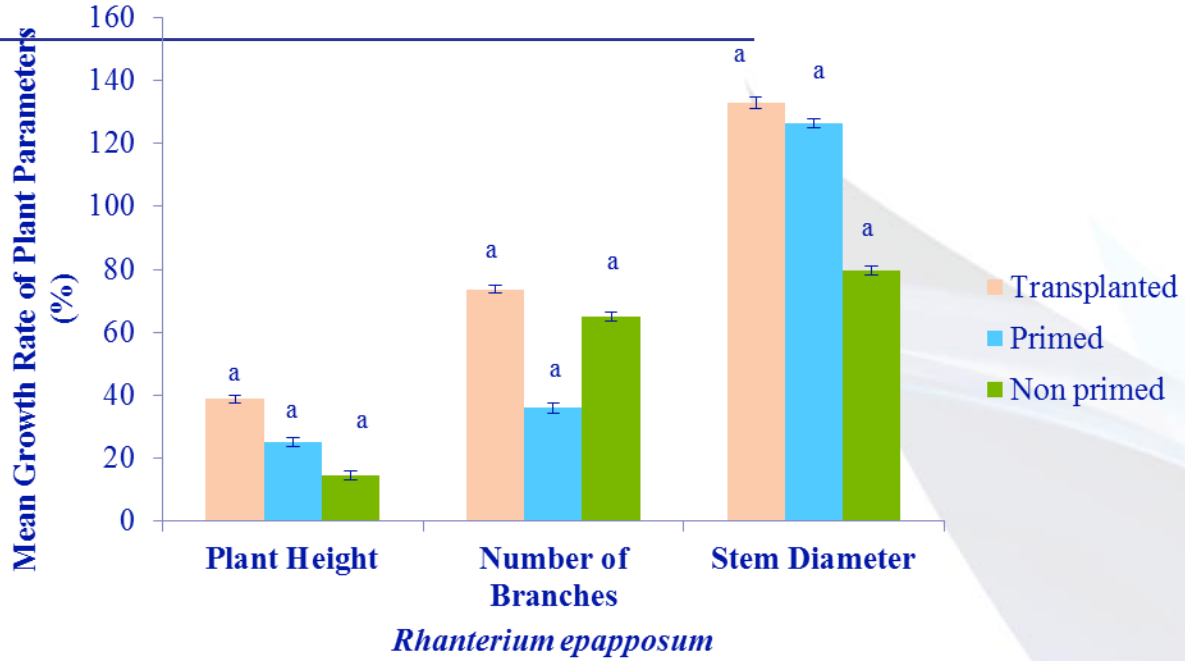
Results- *Rhanterium epapposum*



Germination or survival data of *Rhanterium epapposum*

No significant difference ($p \leq 0.05$) in the survival rate of seedlings during one year after planting, Highest Primed-92%, Transplanted-80%, Non primed- 72%

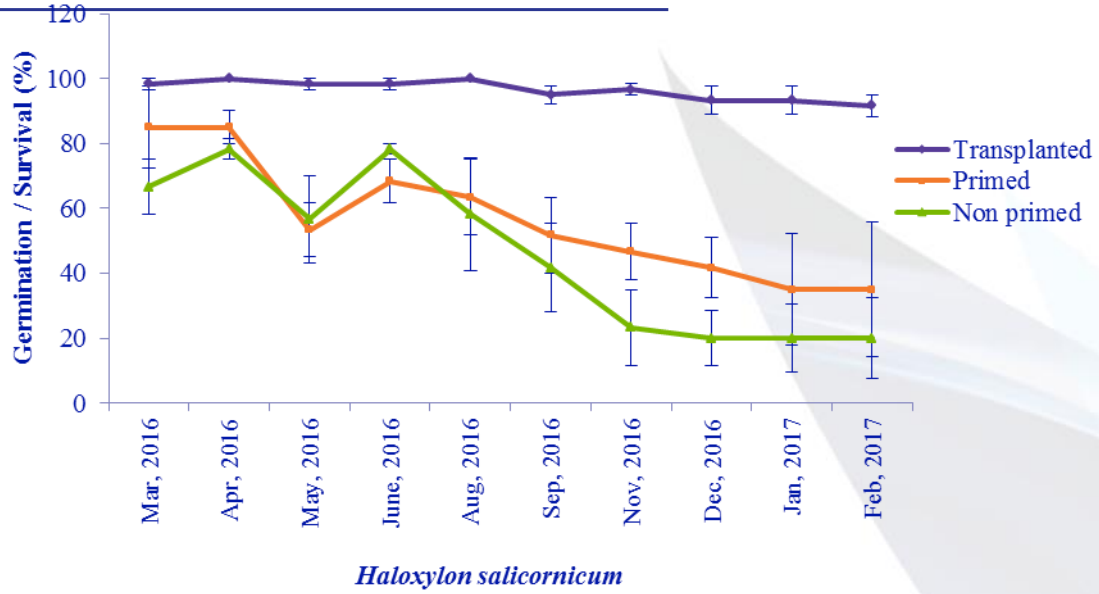
Results- *Rhanterium epapposum*



Mean growth rate of plant parameters in *Rhanterium epapposum*

Growth rate in the plant height, number of branches, and root collar diameter of transplanted seedlings was higher than those in the other two treatments though not significantly

Results- *Haloxylon salicornicum*

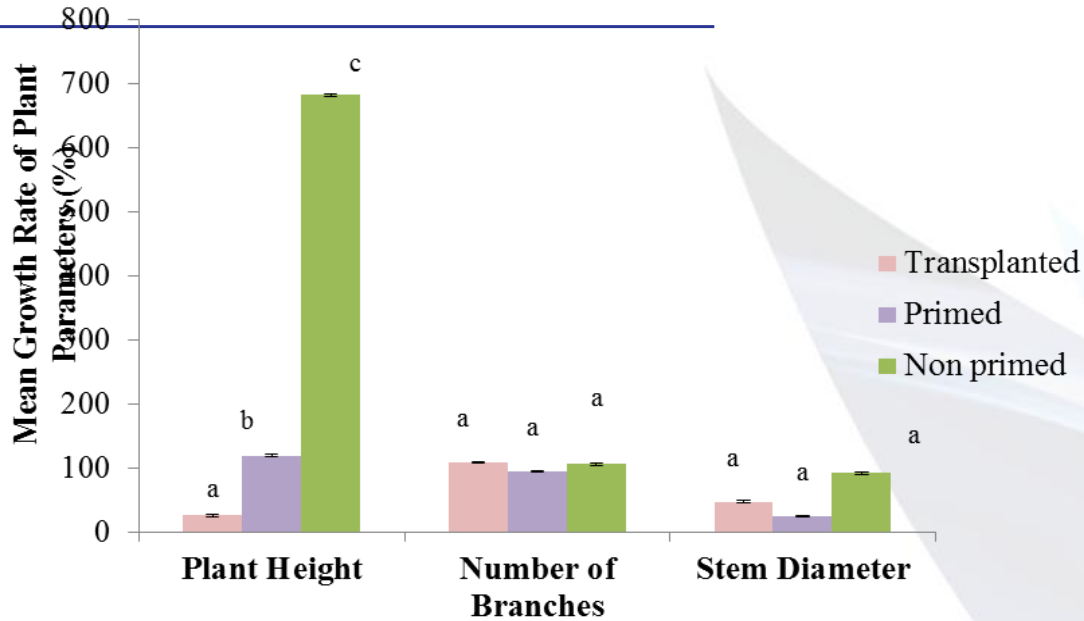


Germination or survival data of *Haloxylon salicornicum*.

- Significant difference ($p \leq 0.05$) in the survival percentage of seedlings from various planting techniques. Transplanted- 92%, Primed- 35%, Non primed- 20%

- Survival in the seedlings from primed and non-primed seeds consistently declined after initial germination, and the mortality was significantly lower in the transplanted seedlings.

Results- *Haloxylon salicornicum*



Mean growth rate of plant parameters in *Haloxylon salicornicum*.

- The growth rate in plant height and number of branches of seedlings from primed and non-primed seeds were significantly higher than those of transplanted seedlings.
- The few plants that managed to survive from primed and non-primed seeds exhibited vigorous growth.

Conclusion

- Survival response of each species was varying.
- Priming of *Rhanterium epapposum* seeds resulted in better survival at the end of one year
- Transplanting technique was found to be superior for *Haloxylon salicornicum*.
- However, observation on survival and growth behavior of these species for a longer period is required to reach a broader conclusion.

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THANK YOU