

Lessons for Restoration from Studies of Plant Establishment and Soil Water Availability in the Sonoran Desert

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Pater**

Can Science Inform Restoration?

- Desert grassland revegetation

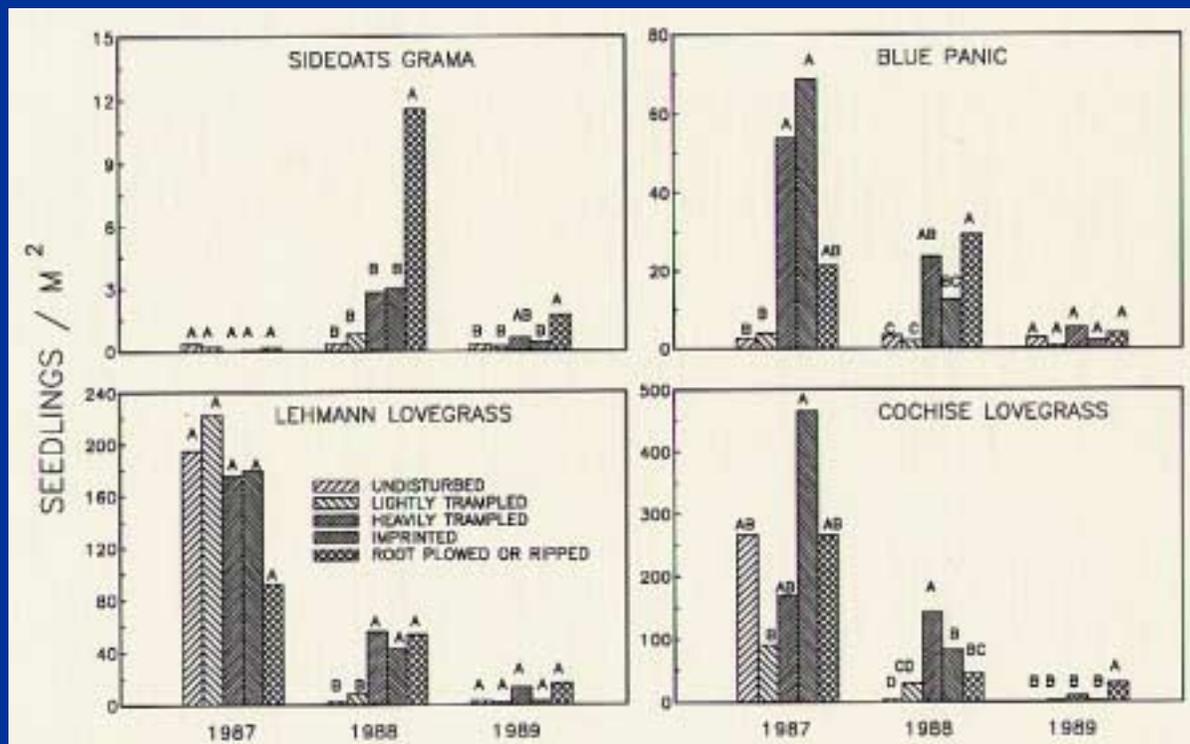


- Abandoned farmland



Desert grassland

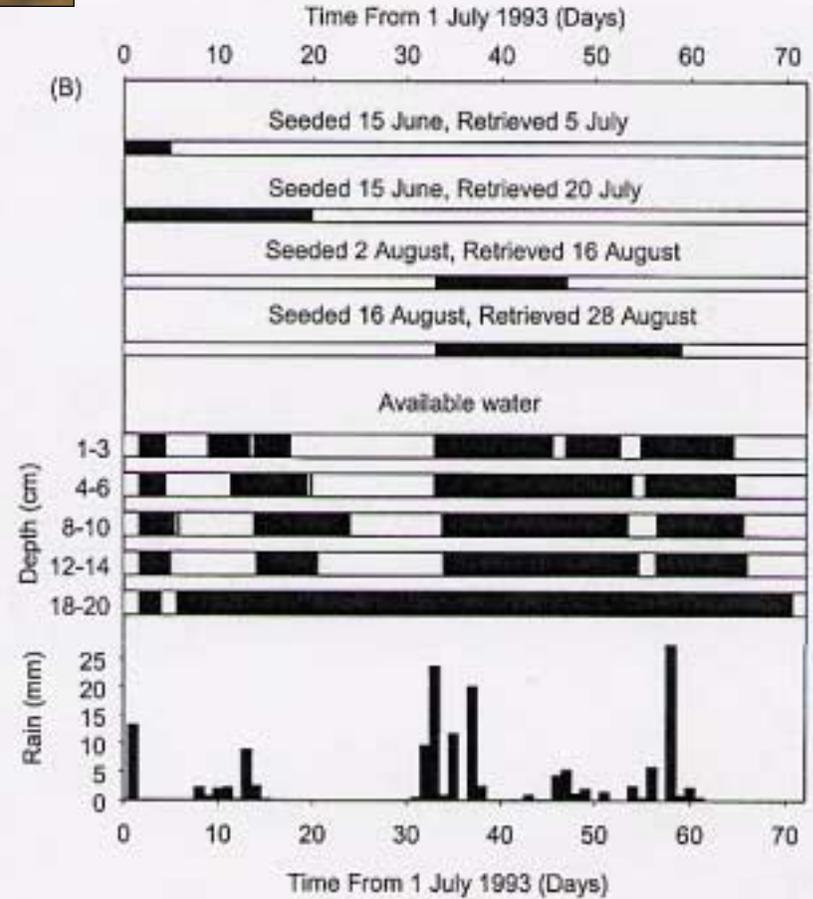
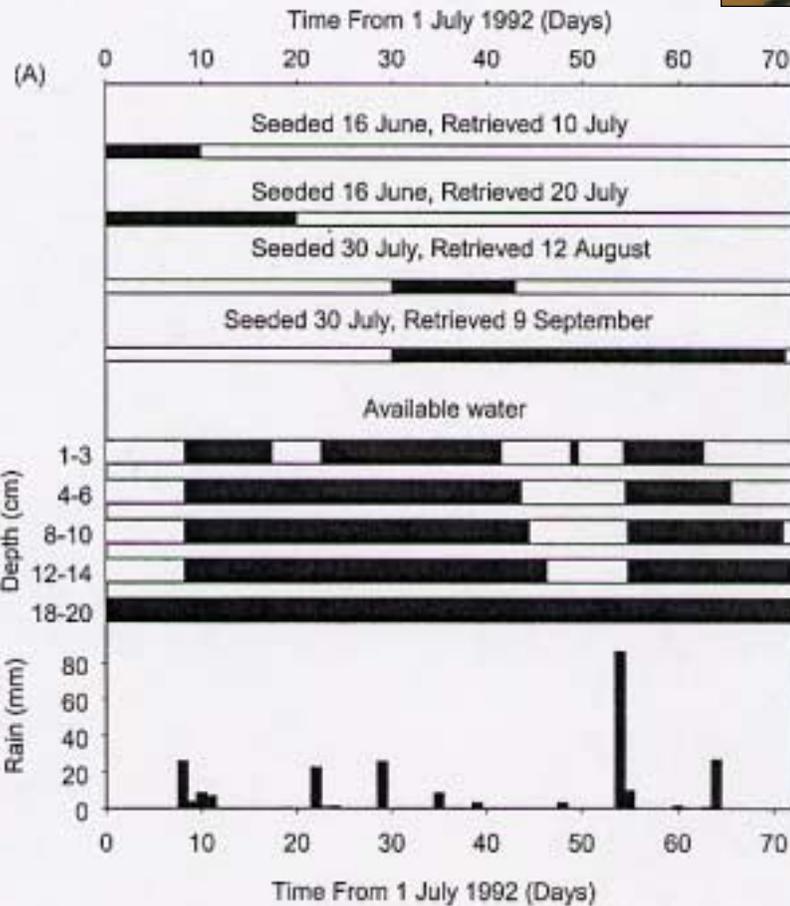




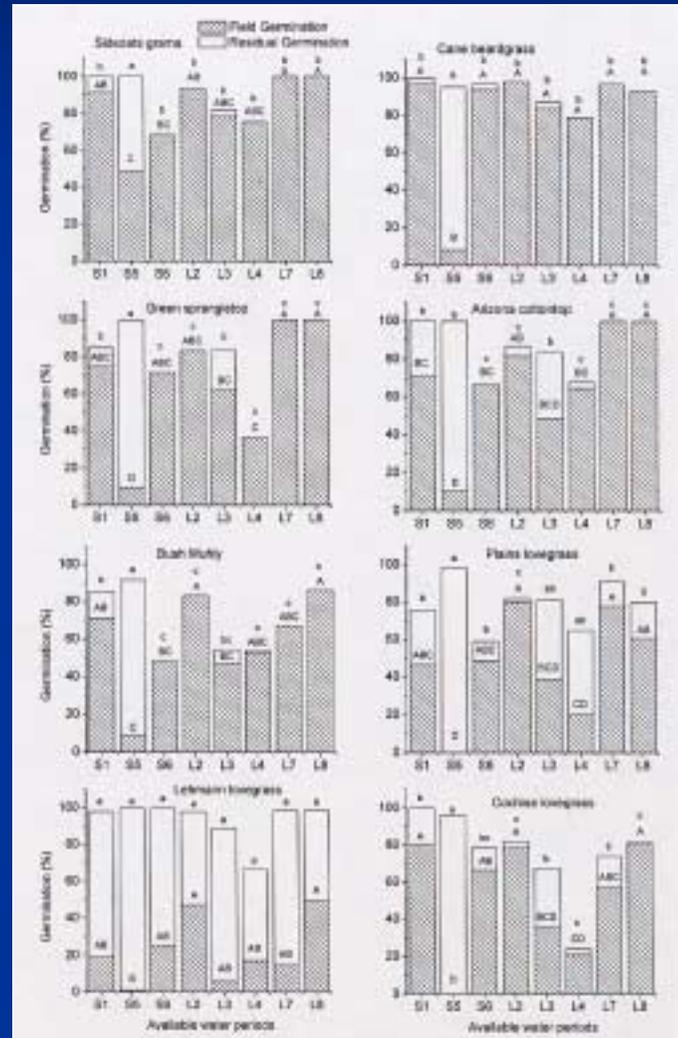
Why do exotic lovegrasses establish better than native grasses ?



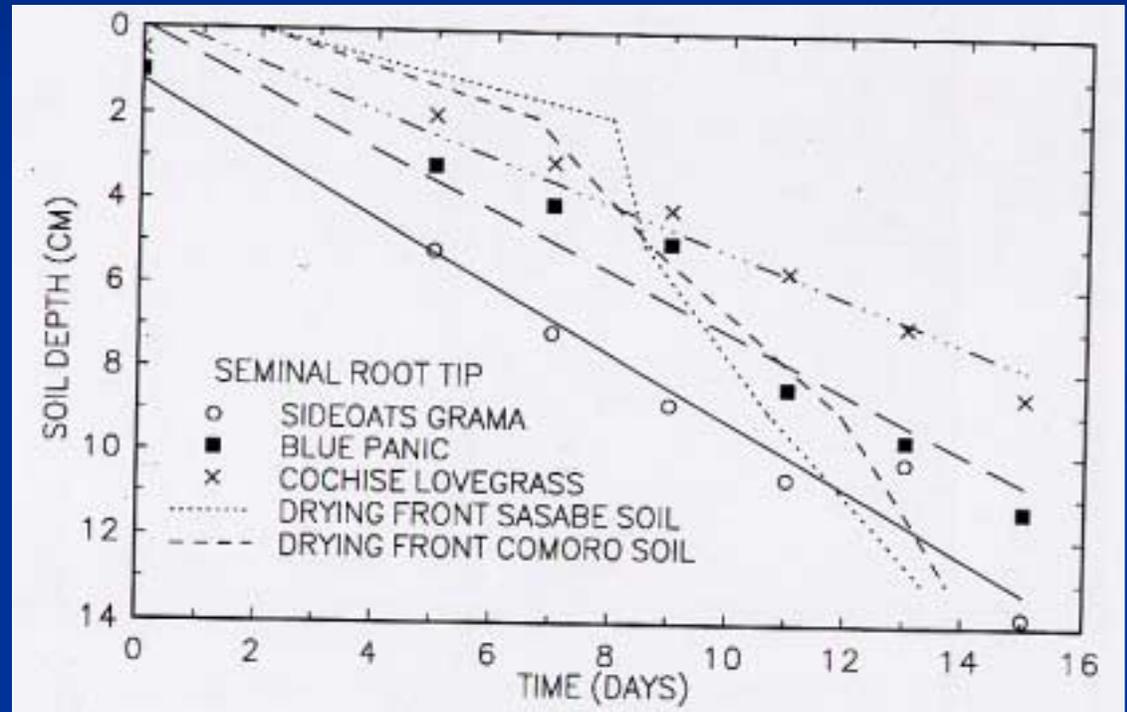
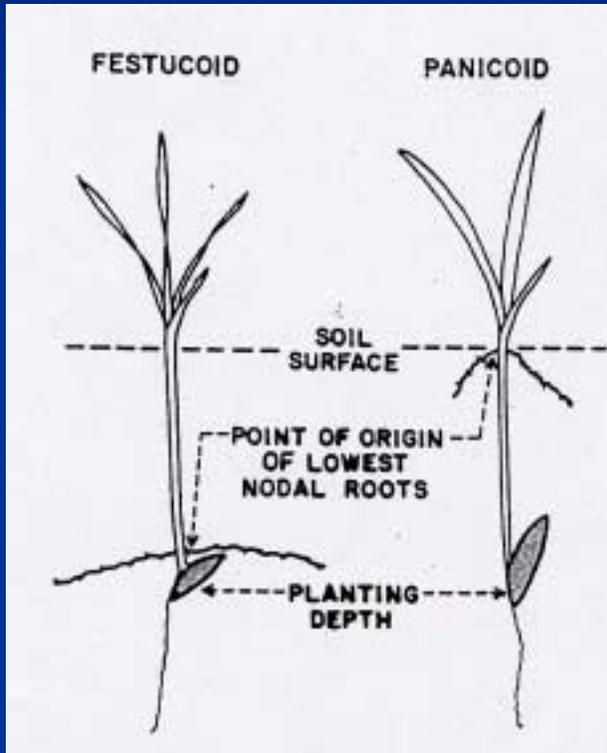
Seed bag experiment



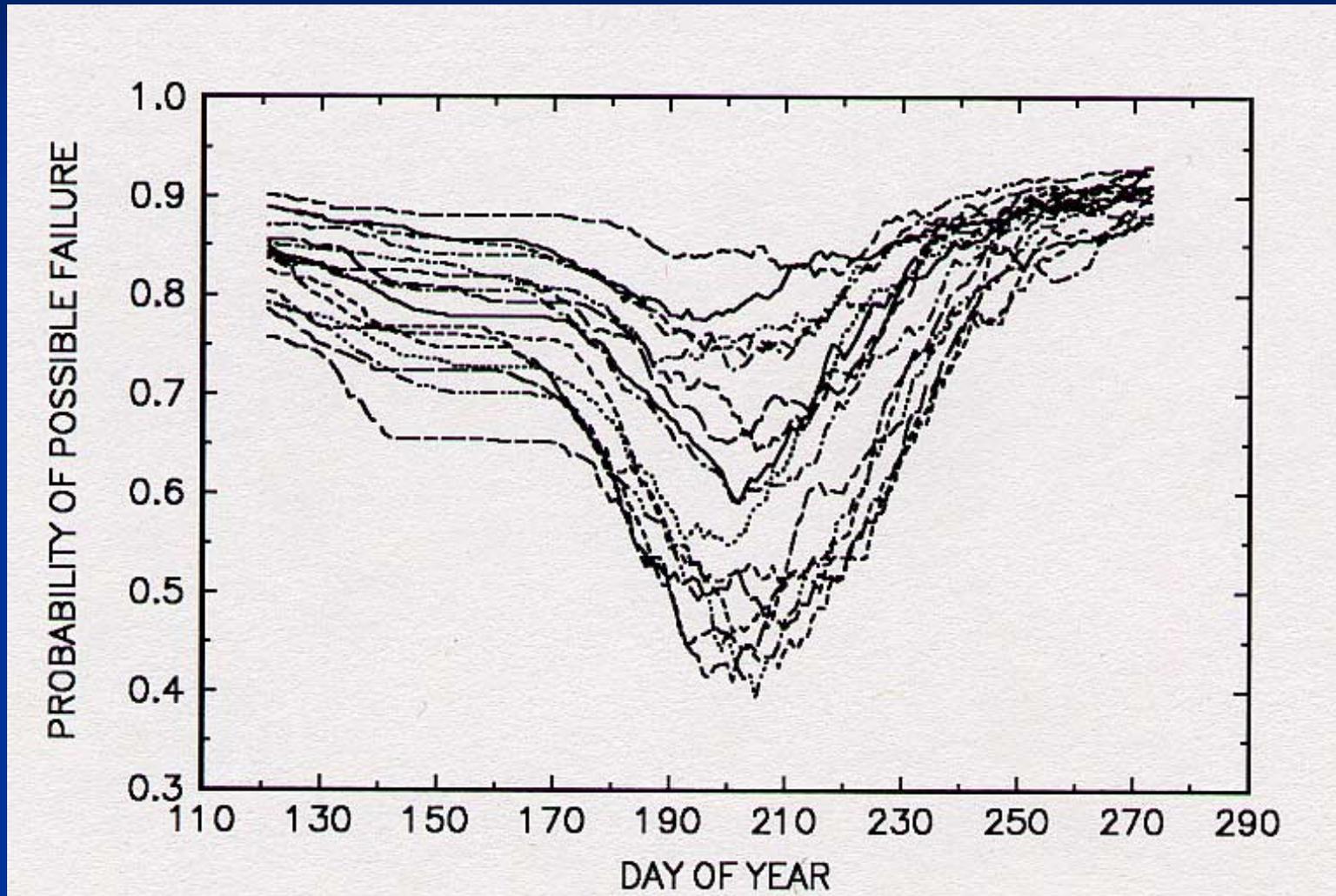
One of these things is not like the others



Seminal root, drying front race



Seeding in middle of rainy season may increase native grass success



How much irrigation is needed to establish native vegetation on abandoned farmlands?



Abandoned Sonoran Desert Farmland Restoration



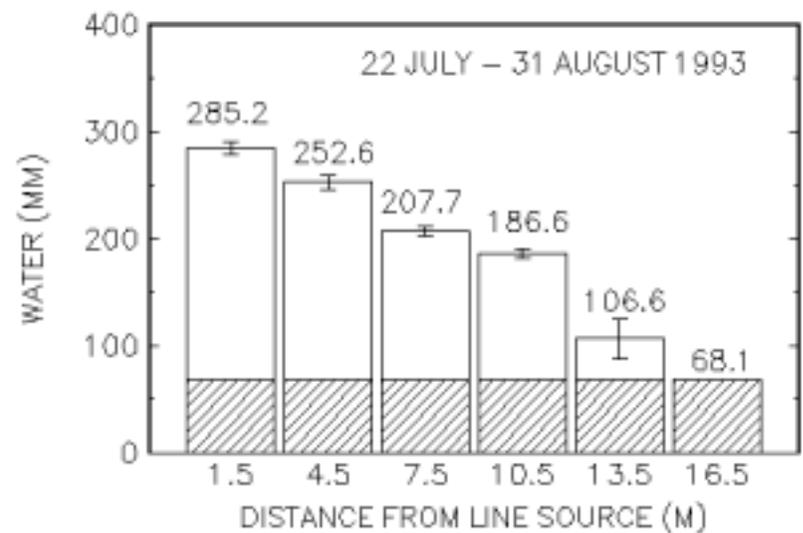
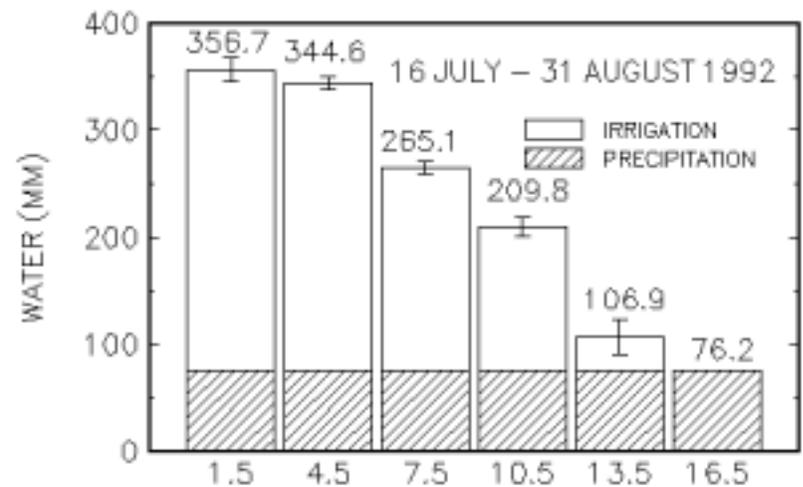
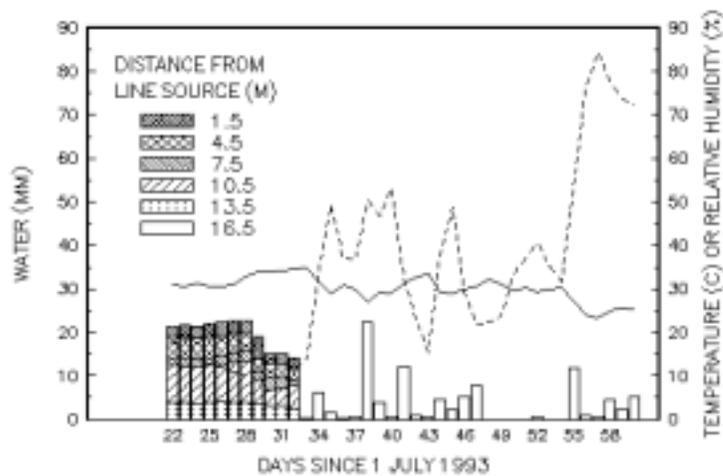
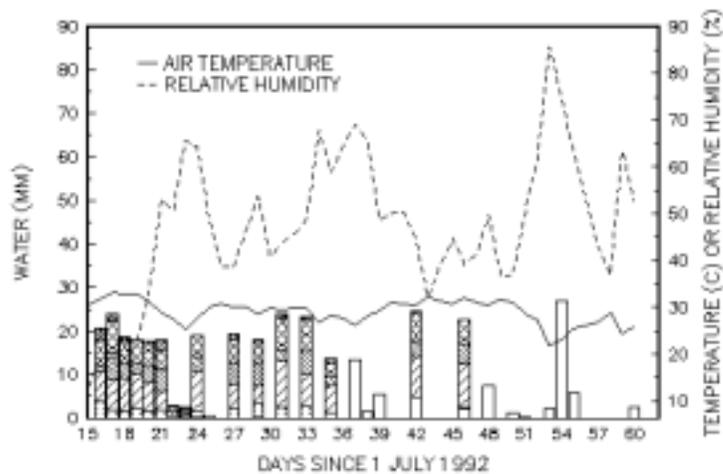
Using line-source sprinkler irrigation to determine water requirements for establishment

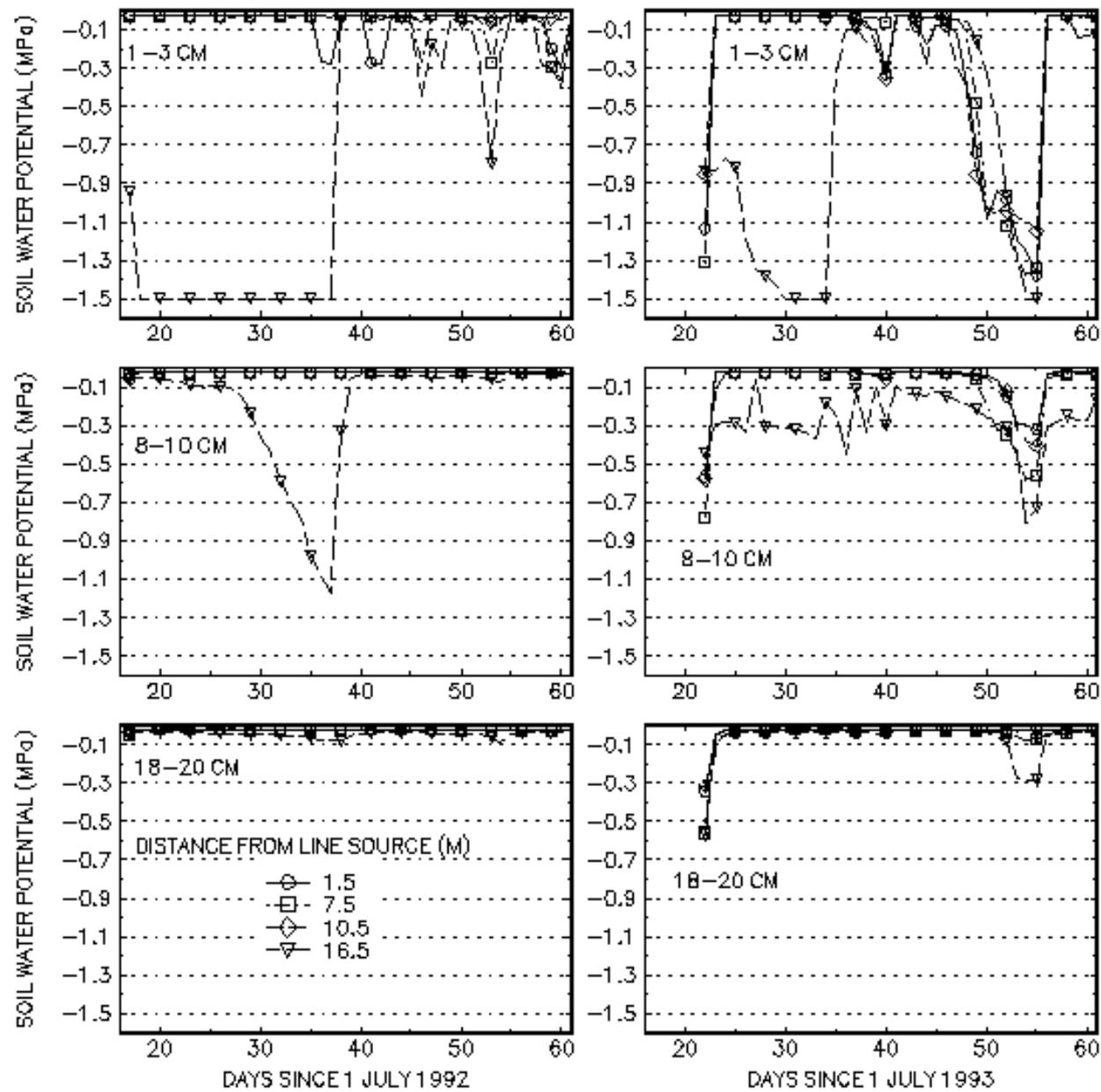


LINE-SOURCE SPRINKLER IRRIGATION GRADIENT SYSTEM

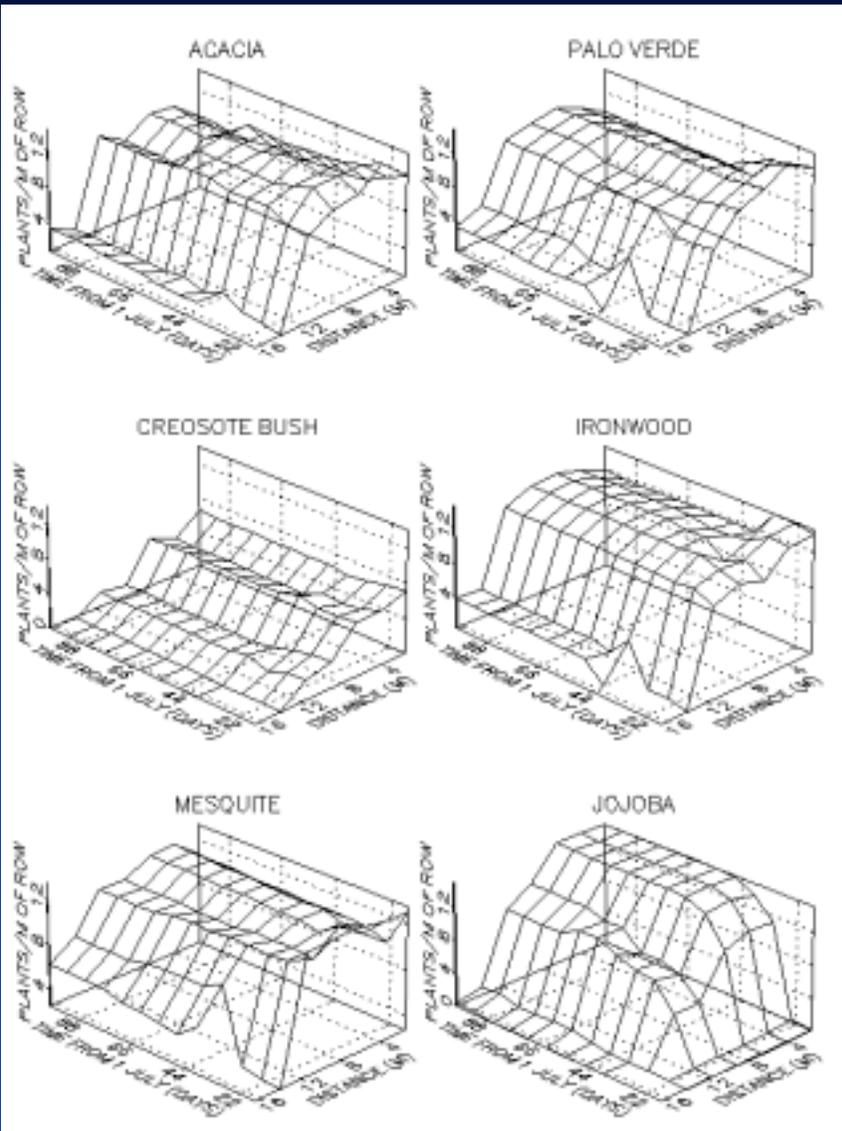
← Decreasing water application

		Rep 6						Rep 5			
		Rep 4						Rep 3			
	18.5	13.5	10.5	7.5	4.5	1.5					
		Rep 2						Rep 1			

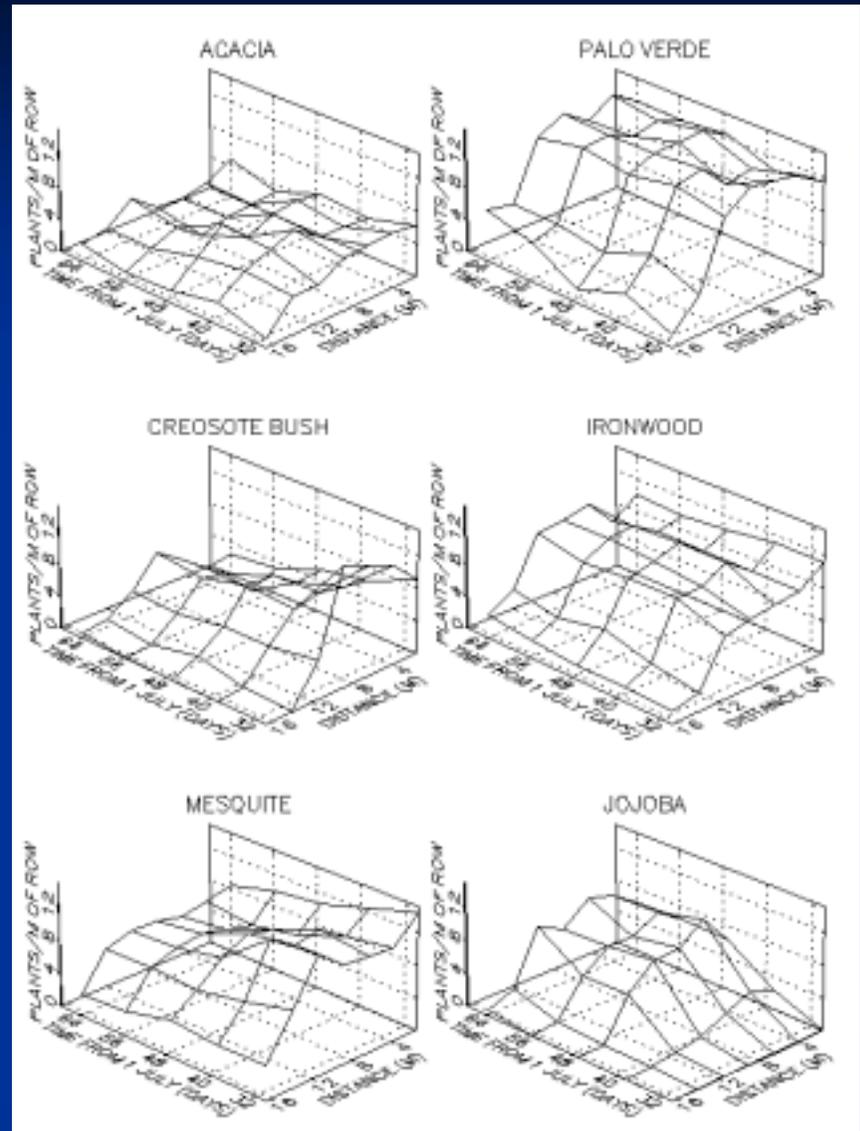




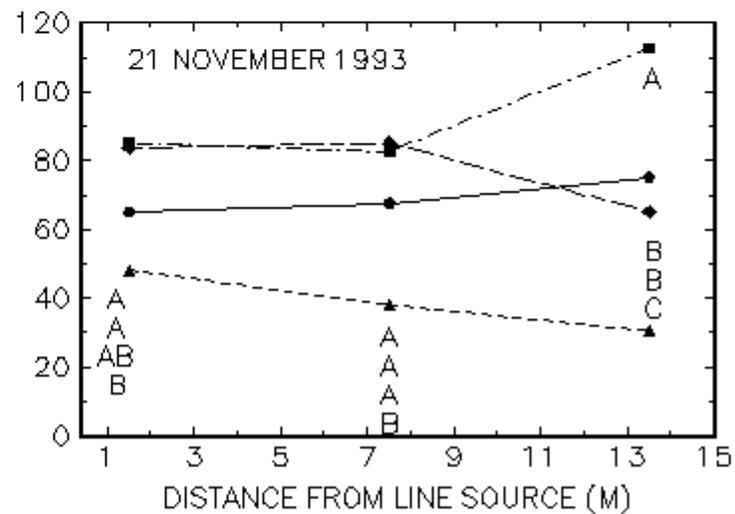
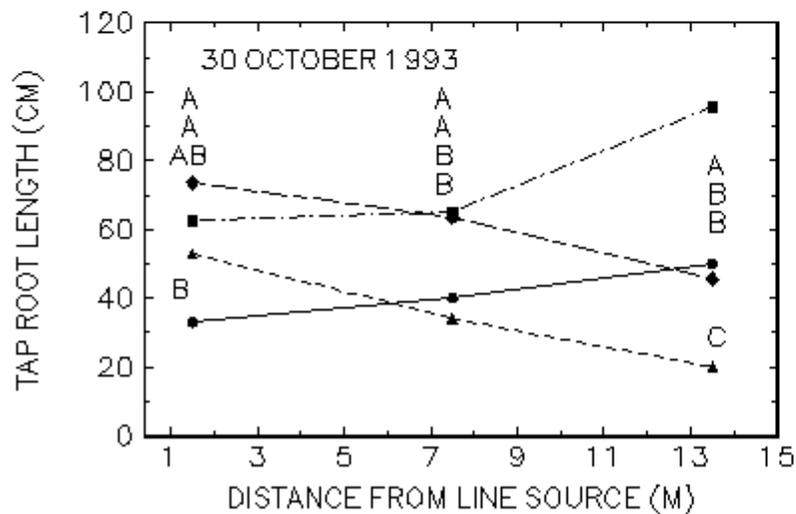
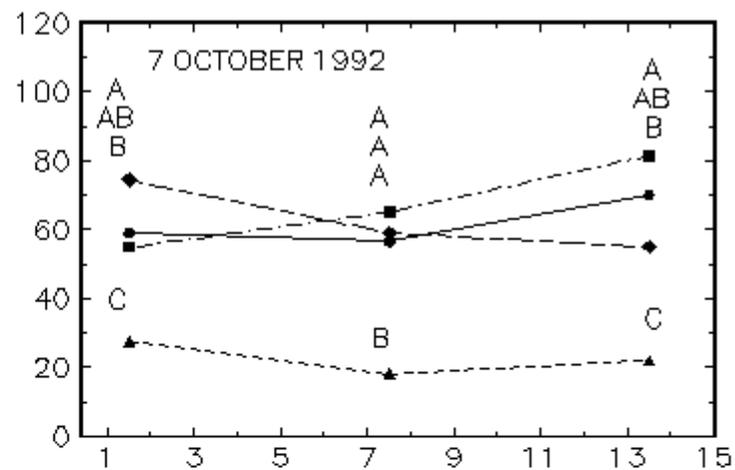
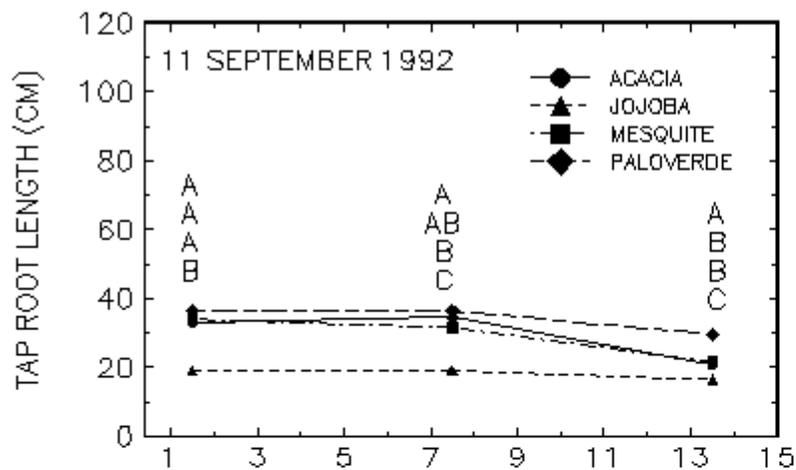
1992



1993

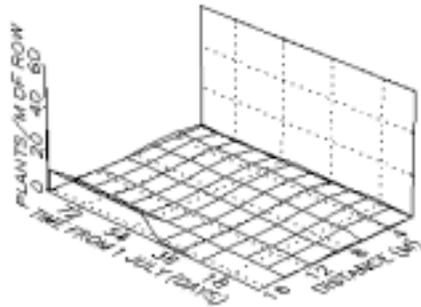




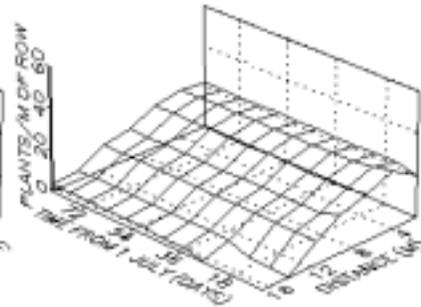


1992

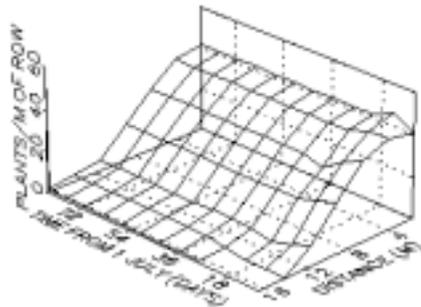
LEHMANN LOVEGRASS



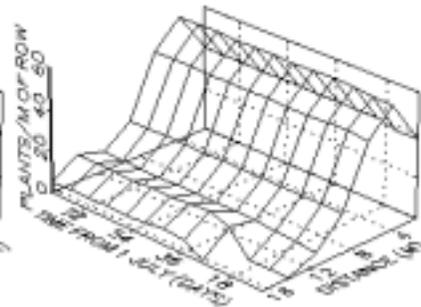
GALLETA



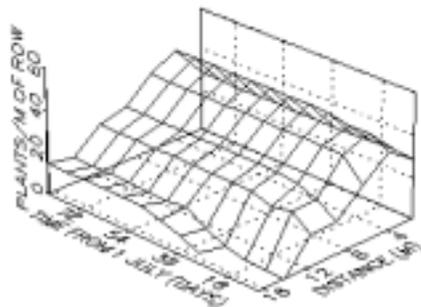
ARIZONA COTTONTOP



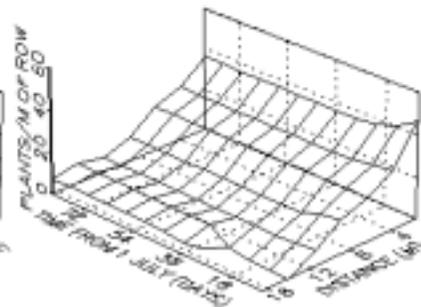
SPIKE DROPSEED



CANE BEARDGRASS

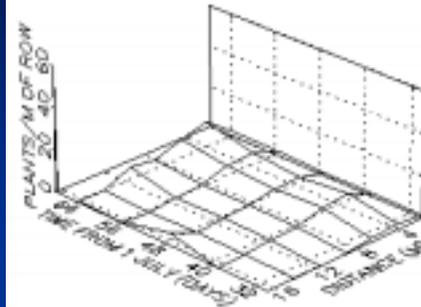


PURPLE THREEAWN

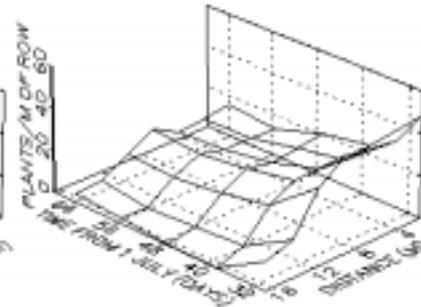


1993

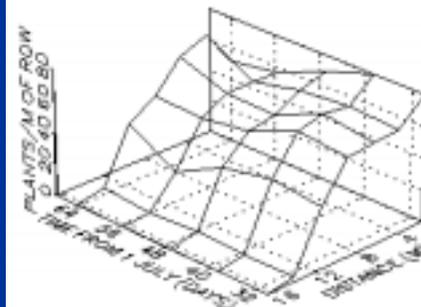
LEHMANN LOVEGRASS



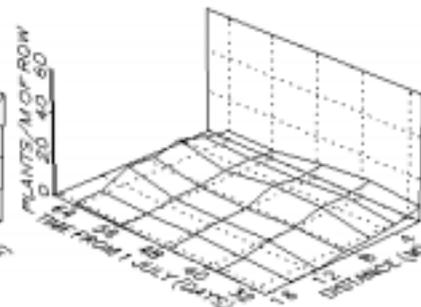
GALLETA



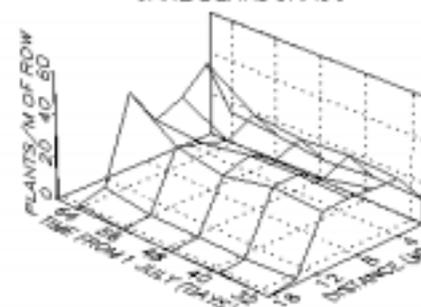
ARIZONA COTTONTOP



SPIKE DROPSEED



CANE BEARDGRASS



Irrigate to fill up root zone while germinating sown species

Table 3. Water (mm, irrigation plus precipitation) that resulted in high, moderate, and low establishment (≥ 15 , 5-14, 0-4 plants per m of row, respectively), of grasses and woody species seeded on a loamy, fine-sand soil in the summers of 1992-1993 at Tucson, Arizona. Differences in water amounts and ranges for a category reflect differences and ranges for the 2 years.

<u>Grasses</u>	<u>High</u>	<u>Moderate</u>	<u>Low^a</u>
	-----mm-----		
Purple threeawn	265	76	—
Cane beardgrass	187-210	76-107	68
Arizona cottontop	107-265	68-210	107
Lehmann lovegrass	—	76-187	—
Galleta	208-265	107	68-76
Spike dropseed	265	76-187	107
<u>Shrubs and Trees</u>			
Cat claw acacia	—	187-210	107
Blue palo verde	—	68-107	76
Creosotebush	—	187-345	107-265
Ironwood	—	210	107
Mesquite	—	76-107	68
Jojoba	345	187-210	76-107

^a Low= plant establishment was not significantly different from zero at the amounts of water indicated.

Conclusion

- Establishment depends on seed and plant response to resources
- Knowing status of resources in time and space helps tell the story
- Seed, plant- resource studies can suggest restoration approaches