

**ARIZONA GAME AND FISH DEPARTMENT  
HERITAGE DATA MANAGEMENT SYSTEM**

**Plant Abstract**

**Element Code:** PDCAC0E040

**Data Sensitivity:** YES

**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE**

**NAME:** *Pediocactus paradinei* B. W. Benson

**COMMON NAME:** Kaibab Pincushion Cactus; Park Pincushion-Cactus; Bristly Plains Cactus; Kaibab Plains Cactus; Paradine Plains Cactus.

**SYNONYMS:** *Pilocanthus paradinei* B.W. Benson and Backenberg

**FAMILY:** Cactaceae

**AUTHOR, PLACE OF PUBLICATION:** Benson, B.W. 1957. Cactus and Succulent Journal of the Cactus and Succulent Society of America. 29:136-137.

**TYPE LOCALITY:** Houserock Valley, Coconino County, Arizona.

**TYPE SPECIMEN:** Boyce Thompson Southwestern Arboretum Herb., No. Bwb 8-1956-1.

**TAXONOMIC UNIQUENESS:** Seven species of *Pediocactus*, occurring from the Columbia River Basin, Great Basin, Rocky Mountains and Colorado Plateau. Six of these species, including *P. paradinei*, are restricted endemics. There are no recognized varieties of *P. paradinei*.

**DESCRIPTION:** Small, green, globose tubercled cactus with a solitary stem 3.0-4.0 cm (1.2-1.6 in.) tall (usually half is underground), 6.0-8.0 cm (2.4-3.2 in.) in diameter (may reach a diameter of 8.0 cm (3.2 in.)). Tap root up to 15.0 cm (6.0 in.) long. **Spines long, flexible and hairlike**, white to ashy gray to straw colored, 4-6 per areole, completely covering stem apex; the longer central spines 25.0-32.0 mm (1.0-1.28 in.) long, not distinguishable from the 20 radial spines (young cacti lack the long central spine). Flowers 2.0-2.5 cm (0.8-1.0 in.) diameter to 2.0 cm (0.8 in.) long; petaloids are white or yellowish with pink midribs, about 20.0 mm (0.8 in.) long to 6.0 mm (0.24 in.) broad. Fruit greenish-yellow becoming tan when ripe, 7.5-10.5 mm (0.3-0.42 in.) long, 4.5-6.0 mm (0.18-0.24 in.) diameter. Fruit is smooth and bare except for the veins; sometimes fruit will have minute subapical scales. Seeds are nearly black, 1.5 mm (0.06 in.) long, about 2.0 mm (0.08 in.) broad and 1.0 mm (0.04 in.) thick (Benson, 1982).

**AIDS TO IDENTIFICATION:** *Coryphantha scheeri* occurs in the same habitat and is easily confused with *P. paradinei*. Spines of *Coryphantha* are stiff and short compared to hair-like spines of *Pediocactus*; this is readily felt by placing a hand over the plants. "Very young plants of *P. paradinei* appear very similar to juvenile plants of *Coryphantha vivipara*, which grows sympatrically with it" (Phillips 1993). *C. vivipara* has stiff and short spines.

**ILLUSTRATIONS:**

Line drawing (Benson 1982:761).

Line drawing (USFWS)

Color photo (Hochstätter 1998 in [http://64.177.111.31/images/others\\_pictures/fh052\\_5.jpg](http://64.177.111.31/images/others_pictures/fh052_5.jpg))

Color photos (Miller 2000-2001 in <http://www.cactuscollection.net/>)

**TOTAL RANGE:** East side of the Kaibab Plateau (East Kaibab Monocline) and west edge of House Rock Valley, Coconino County, Arizona.

**RANGE WITHIN ARIZONA:** See "Total Range."

## **SPECIES BIOLOGY AND POPULATION TRENDS**

**GROWTH FORM:** Globose Succulent Perennial

**PHENOLOGY:** Flowers mid-April to May. Fruits May - June. Species has low reproductive potential (500 seeds per individual lifetime) (Phillips 1999).

**BIOLOGY:** Plants are usually patchily distributed within a general area of appropriate habitat; occurring singly, or more often, in groups within well defined colonies. Those specimens from lower elevations tend to be smaller and not colonial as compared with those from higher on the Kaibab Plateau. Specimens from the upper Kaibab Plateau tend to be more robust and often form clusters with up to 7 stems. This could be due to the higher precipitation and/or colder temperatures in the higher elevations of its range (Heil et al. 1981).

*P. paradinei* shrinks and swells in response to water availability and retracts below ground during the hottest months of summer and coldest months of winter. It should be noted that "when specimens are in this withdrawn state, it becomes almost impossible to find them in their natural state even though their exact locality is known" (Heil et al. 1981). Almost three-quarters of the biomass of the plant is underground.

Reproduction occurs entirely from seed. Generally plants begin blooming when approximately 2.0 cm (0.8 in.) in diameter, presumably 10 years old. One to two seed pods (fruits) are produced per plant each year. At maturity the fruit are dry, obovate, rounded at the base, truncate at the top and open by a longitudinal fissure. Seeds are very small with 12-15 seeds per fruit. The largest/oldest plants produce the most flowers, fruit and seeds. The largest plant known has a diameter of approximately 10.0 cm (4.0 in.) and produced about 6 flowers. The life span of *P. paradinei* is expected to be about 40 to 50 years. With an average of a 30 year reproductive life-span, an individual plant may produce about 500 seeds. This represents a very low reproductive potential. No seed dispersal is known; seeds fall to the base of the parent plant (Laurenzi and Warren, 1988; and Peter Warren--North Kaibab Plant Workshop, June 1992). Heil et al. (1981) noted plants can "...flower and set fruit on what appears to be juvenile stems."

Monitoring of two burned sites in 1987-1990 showed approximately 90% survivorship after a cool fire, but approximately 60% survivorship after a hot fire. This species appears more fire

tolerant than other cacti species. Even with virtually the entire above ground portion of the plant charred, 20% of the individuals survived to produce flowers and fruit equal to non-burned plants (Warren et al. 1992).

**HABITAT:** Fairly open, mostly level sites on alluvial fans, valley bottoms and ridge tops. Plants are preferentially associated with grass (blue grama), often occurring within the grass clump. In valley bottoms with sagebrush, occurs in the grassy openings within open sagebrush stands (not found in pure sagebrush).

**ELEVATION:** 5,000 - 7,200 ft. (1,525 - 2,196 m)

**EXPOSURE:** South facing slopes. Level to slope of no more than 10-15%.

**SUBSTRATE:** Gravelly soils derived from Kaibab limestone; high in calcium carbonate (reduced clay content).

**PLANT COMMUNITY:** Associated with grass (blue gramma) in Great Basin grassland, desertscrub, pinyon-juniper woodland, and lower ponderosa pine stringers.

**POPULATION TRENDS:** Some downward trends. Collection was documented at the Trail Canyon plot in 1990 with about 20 plants removed; obvious digging and boot tracks. Mortality on the monitoring plots vary a lot from site to site and year to year. With three years of data (to 1992) there has been about 20-30% mortality, slightly higher than recruitment. Part of this mortality has been due to predation by rodents and/or lagomorphs.

## **SPECIES PROTECTION AND PRESERVATION**

**ENDANGERED SPECIES ACT STATUS:** None (USDI, FWS 1998)  
[C USDI, FWS 1996]  
[C1 USDI, FWS 1980]  
[PTN-T USDI, FWS 1975]

**STATE STATUS:** Highly Safeguarded (ARS 1993)

**OTHER STATUS:** Forest Service Sensitive (USDA, FS Region 3 2007)  
[Forest Service Sensitive (USDA, FS Region 3 1990, 1999)]  
Bureau of Land Management Sensitive (USDI, BLM AZ 2000, 2005, 2008, 2010)

**MANAGEMENT FACTORS:** Collected for the cactus and succulent trade. Loss of habitat to shrub (especially sagebrush) and woodland invasion brought about by fire suppression. Herbivory by jackrabbits. Trampling by livestock and removal of grass cover.

High mortality when exposed to excessively hot fires. Using fire to manage *P. paradinei* habitat requires that the prescribed burn be designed especially for *P. paradinei* management (not to attempt to accomplish other goals, such as shrub control). The fires must be carefully applied (season, temperature of fire) to avoid habitat damage and high cacti mortality.

The entire distribution of this species is within an area of approximately 15 miles north-to-south and 2-3 miles east-to-west.

Difficult to survey; the plants retract into the soil in response to moisture and often occurs within grass clumps.

Being found on fairly open, level sites increases the plants' vulnerability to impacts from recreation such as camping, and from road construction.

**CONSERVATION MEASURES TAKEN:** Monitoring plots established under USFS contract in 1985 and expanded in 1987. As of 1992, there were 14 plots which included approximately 1,000 monitored plants.

**SUGGESTED PROJECTS:** Development of Habitat Management Plan by USFS. Assessment of impacts of burning on cacti and habitat. Assessment of mechanical sagebrush suppression on *P. paradinei*. The plant was reported by Frank Reichenbacher in the early 1980s from the north/west side of the Kaibab Plateau. This is outside the documented distribution of the plant. This locality has not been re-located but additional searches are needed.

**LAND MANAGEMENT/OWNERSHIP:** BLM - Arizona Strip Field Office; USFS - Kaibab National Forest (North Kaibab Ranger District).

## **SOURCES OF FURTHER INFORMATION**

### **REFERENCES:**

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**ADDITIONAL INFORMATION:**

Phillips B.G. et al. (1981) recommended for Threatened status under the Endangered Species Act.

**Revised:** 1989-10-30 (LJB)  
1992-09-14 (BKP)  
1997-11-12 (SMS)  
1998-04-24 (SMS)  
1999-12-20(DJG)

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