# DOES PRICKLYPEAR PROTECT QUAIL NESTS?

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*Abstract*: Current pricklypear control strategies achieve over 95% kill. Though a sound practice for livestock producers who desire to maximize forage production and reduce livestock health problems, treatment of all pricklypear on a given rangeland unit could degrade the quality of quail nesting habitat. In west Texas 12 of 21 nest sites were found to be in, or adjacent to, pricklypear. In another study in west Texas and the Rolling Plains region significantly longer artificial nest survival was observed in pricklypear nests compared to grass nests. Pricklypear appears to serve a valuable function in providing nesting sites in areas where, through drought or over-grazing, "traditional" bunchgrass nest sites are limited in abundance.

## The Situation

Pricklypear cactus (*Opuntia* sp.) occupies an estimated 16 million acres, or 28 % of the rangeland in Texas (Lundgren et al. 1981). Past grazing and mechanical control practices have encouraged spread of the plant. The result has been the encroachment of the plants into vast portions of the state, particularly the Rolling Plains and Rio Grande Plain ecological regions. Consequences of proliferation of the plants are many and varied.

## The Problem

Health problems such as pear-mouth result from livestock coming into contact with the plants while foraging near them, or from consuming the succulent pad-like leaves, which are covered with sharp spines. Oral irritation from contact with the spines, many of which break off and become lodged in the tissue of the mouth, tongue, and face inhibits normal grazing. Potential subsequent infection can threaten the overall health of the animal.

Forage production is reduced by the presence of pricklypear. Eventhough the plants provide a protective haven for some species of plants which are highly preferred by livestock and wildlife, the space occupied by the thorny plants precludes the growth of a greater amount of forage which could be grown in their absence.

Bobwhite quail (*Colinus virginiana*) hunting is negatively affected by large expanses of pricklypear. The plants often grow in colonies large enough to make passage by a hunter practically impossible. Zealous bird dogs suffer from inevitable contact with the spines in their pursuit of quail.

## The Response

Control measures aimed at managing pricklypear infestations are considered to be essential for the continued economic viability of many livestock operations. Highly effective technology has been developed in recent years addressing the problem. A combination of prescribed fire followed by an aerial application of pichloram (Ueckert et al. 1988) has been used to kill as much as 96% of pricklypear plants. Quail hunters have, for the most part, appreciatively enjoyed the improved hunting environment.

## However.....

The Rolling Plains and Rio Grande Plain in addition to being home for some of the highest densities of pricklypear in Texas, also provide the highest densities of bobwhite quail in the state (Sauer et al. 1997). Bobwhites reportedly benefit from pricklypear for nesting cover (Lehman 1984), for its ability to protect potential bunchgrass nest sites from grazing (Jackson 1972), and for loafing cover (Guthery 1986). With the realization that high pricklypear densities and high bobwhite quail densities coexist in these two regions, the question arises: Might the relatively high densities of bobwhites be a result of greater reproductive success caused by the selection of pricklypear nesting sites rather than the more "traditional" bunchgrass site? Or, stated another way: Does the availability of pricklypear at least partially explain the higher densities of birds due to its ability to provide a significant degree of increased protection for nests, i.e. are nests placed there less vulnerable to predation? The answers could have a direct bearing on the degree of our response to pricklypear infestations with contol measures.

## The Studies

The literature yields very little research dealing with quail nesting ecology in relation to pricklypear. Only recently have intensive studies been undertaken. The proven effectiveness of pricklypear control techniques and the lack of documentation regarding the importance, or lack thereof, of the plants to quail has been the impetus for three studies. One was detailed earlier in this meeting by Fidel Hernandez. The two others will be mentioned here.

Carter (1995) studied the effect of prescribed burning on bobwhite populations in west Texas, and, in the process, collected some information of interest to the above questions. By following radio-collared hens through the nesting season in areas burned and areas un-burned, he found no significant difference in the two areas with regard to quail nesting affinity. However, more than half of the nests incubated (12 of 21) were situated in, or adjacent to, pricklypear (Table 1). Of the twelve 5 were successfully hatched, 4 were abandoned, and 3 were destroyed. Similar results were observed with nests in other vegetation types. Additionally, 8 of 12 scaled quail (*Callipepla squamata*) nests were located in pricklypear (P. Carter, Angelo St. Univ., unpubl. data).

Bobwhites placed 8 of the above 21 nests in burned areas, 7 of those in cacti associations and 1 in brush/grass (Figure 1). Thirteen were situated in un-burned pastures, with 5 constructed in cacti associations, 3 in brush/grass habitats, and 5 nests in grass. Based upon this admittedly small sample size, pricklypear may play an important role in bobwhite nesting ecology, at least in semi-arid regions where limited nesting cover in the form of bunchgrass is often the case.

Slater (1996) studied the survival of simulated nests placed in association with pricklypear compared with those placed in bunchgrass. Mean survival times of pricklypear nests in 3 of 4 study areas in 1995 were significantly longer ($P \leq 0.05$) than those for grass nests (Table 2). No significant difference was found in the fourth study area. The mean percentage of pricklypear nests surviving the 28-day monitoring period was significantly higher than grass nests in 2 of the 4 areas, with no significant difference between treatments in the other 2.

In 1996 pricklypear nests in 5 of the 8 study areas had significantly longer ($P \leq 0.05$) mean survival times than those placed in grass. No difference in treatments was found on the remaining three study sites. Mean percentage of pricklypear nests surviving the 28-day period was significantly higher than grass nests on three of the 8 areas. The mean percentage of nests surviving for the 28-day period was similar for the pricklypear and grass nests in the other 5 study areas.

Survival of simulated grass nests increased with increased abundance of potential grass nest sites ($r^2=0.698$; $P \leq 0.01$). There was no correlation between abundance of potential pricklypear nest sites and simulated nest survival.

Slater (1996) reported that his data suggested that survival of quail nests placed in pricklypear colonies might be enhanced, especially during drought or on heavily grazed rangeland with a scarcity of suitable bunchgrass nest sites.

## The Bottom Line, for Now

Limited research involving relatively small sample sizes has shown an apparent benefit of pricklypear to quail for nesting sites. Nest survival can be increased by the use of pricklypear for nesting. Bobwhites seem to resort to pricklypear for nesting when other "traditional" bunchgrass sites are unavailable, e.g. after fire or over-grazing.

Survival of nests can be expected to increase with increasing abundance of suitable grass nest sites. But on range typically over-grazed or in semi-arid, drought-prone areas, some pricklypear should be maintained since the likelihood of an adequate density of bunchgrass nest sites may be low.

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Table 1. Nesting site selection and fate of nests of radio-marked bobwhites in west Texas, 1994-95 (n=21). (from Carter 1995)

| | | | | Nest | | |
|---|---|---|---|---|---|---|
| Sex | Age | Site | Treatment | Location | Habitat | Fate |
| F | I | 1 | control | control | cacti/grass | abandoned |
| F | I | 1 | control | control | cacti/grass | depredated |
| F | I | 1 | burn | control | grass | successful |
| F | I | 1 | control | control | brush/grass | successful |
| F | I | 1 | control | control | brush/grass | successful |
| F | M | 1 | control | control | cacti/grass | abandoned |
| F | I | 2 | burn | burn | brush/grass | abandoned |
| F | I | 2 | burn | control | brush/grass | abandoned |
| F | I | 2 | control | control | grass | abandoned |
| F | I | 2 | burn | burn | cacti/grass | abandoned |
| F | I | 2 | control | control | grass | abandoned |
| F | M | 2 | control | control | grass | depredated |
| F | I | 3 | burn | burn | cacti/grass | depredated |
| F | I | 3 | burn | burn | cacti/grass | successful |
| F | I | 3 | burn | burn | cacti/grass | successful |
| F | I | 3 | burn | burn | cacti/grass | successful |
| F | M | 3 | control | control | cacti/grass | abandoned |
| F | M | 3 | control | control | cacti/grass | successful |
| M | I | 2 | burn | control | grass | abandoned |
| M | M | 3 | burn | burn | cacti/grass | depredated |
| F | M | 3 | burn | burn | cacti/grass | successful |

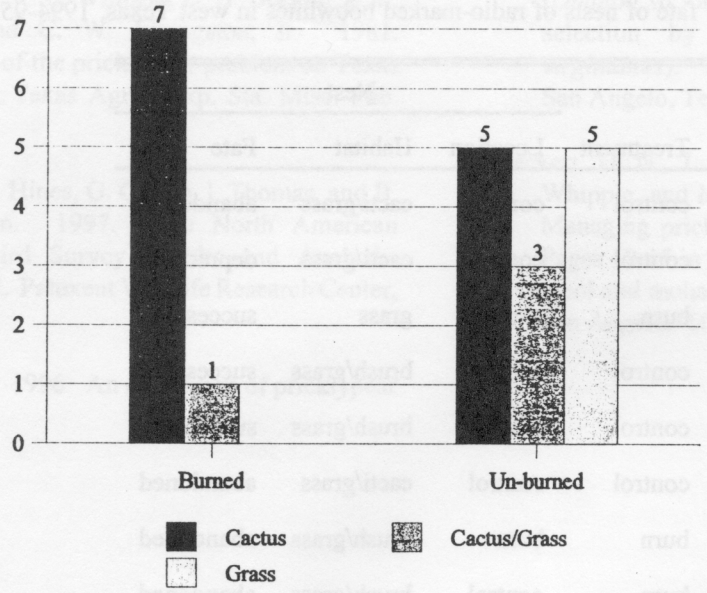


Figure 1. Nesting site selection of radio-marked bobwhites in west Texas, 1994-95 (n=21). (from Carter 1995)

Table 2. Mean survival time (in weeks) of simulated nests in both treatments at each study site in 1995 and 1996. (From Slater 1996)

| | 1995 | | 1996 | |
|---|---|---|---|---|
| Study site | Grass | Pricklypear | Grass | Pricklypear |
| Coleman Co. | 0.28 a[1] | 2.08 b | 1.22 a | 2.61 b |
| Crockett Co. | 2.08 a | 2.94 b | 0.06 a | 0.33 a |
| Shackelford Co. | 2.97 a | 3.06 a | 3.53 a | 3.39 a |
| Tom Green Co. | 0.03 a | 1.06 b | 0.53 a | 1.83 b |
| Cottle Co. | - | - | 2.69 a | 3.11 b |
| Fisher Co. | - | - | 2.78 a | 2.83 a |
| Reagan Co. | - | - | 1.44 a | 2.36 b |
| Sterling Co. | - | - | 2.00 a | 2.47 b |

[1] Means within rows within years with different letters are significantly different ($P \leq 0.05$)