

GOOD AGRICULTURAL PRACTICES FOR PECANS IN TEXAS

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I. SUMMARY OF TEXAS PECAN HISTORY

Indians, prior to European settlement in the new world, utilized pecans as a winter food source as tribes annually returned to their sites along rivers and streams to gather and eat pecans. Tribes in what is now Texas would not store or transport their harvest; it was consumed on the river and when the crop was exhausted they moved to other food sources.

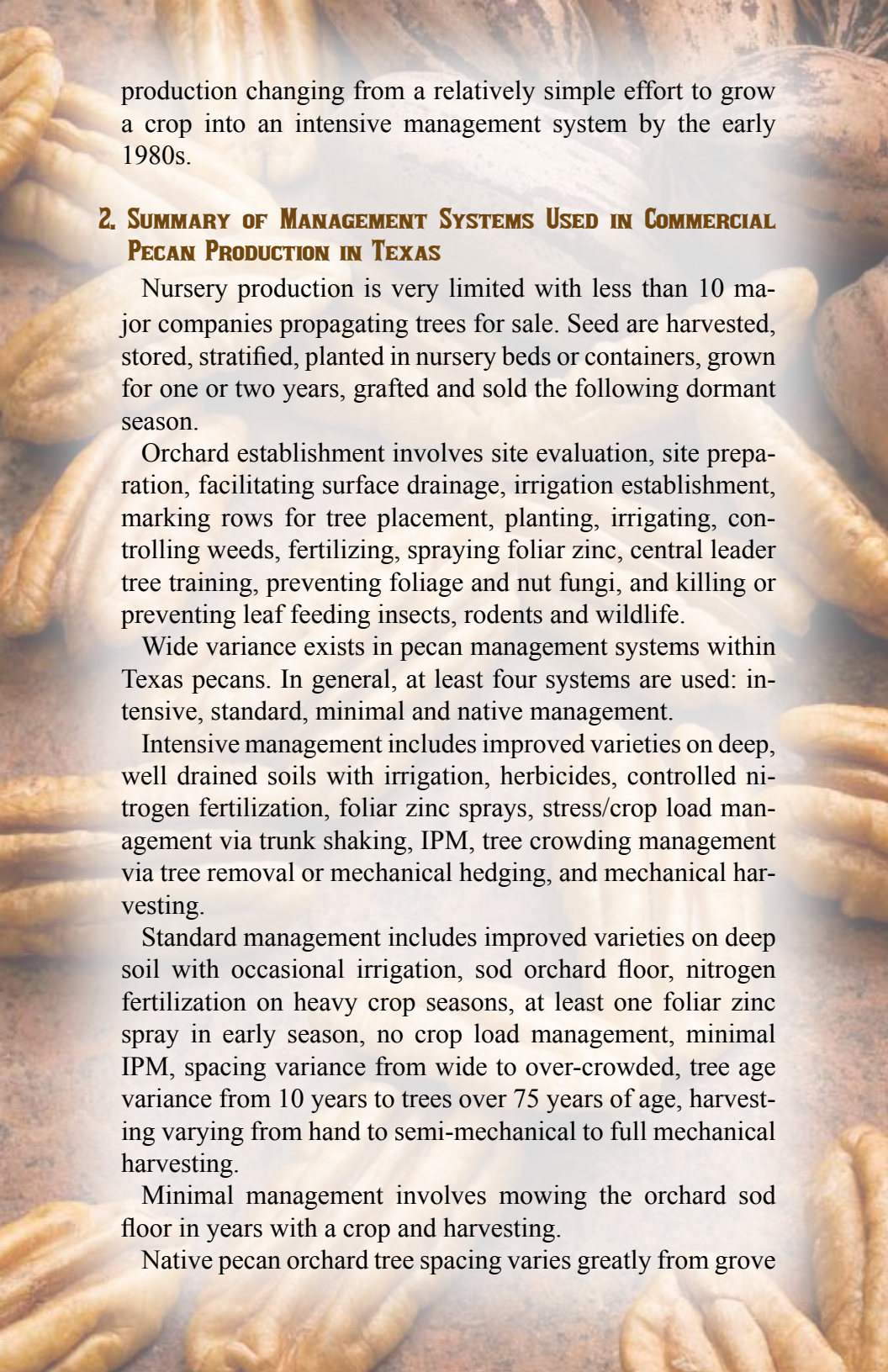
Texas settlers removed pecan trees to plant cotton on the best river bottom soils. Crops from wind blown or pole thrashed trees were harvested off the ground by hand, consumed, stored or sold. In some instances, trees were cut down to harvest the crop.

Native grove improvement was developed on outstanding river bottom sites in the late 1800s. Some orchards were established by planting seeds or seedlings of outstanding native pecans before grafting and nursery production was established.

Grafting native trees to outstanding native selections was practiced from 1890 and continues today in a limited extent in better native groves. Plantings of improved varieties began in the early 1900s using wide spacing and on soils with sufficient depth for sustained production.

Improved variety selection, propagation and production continue as major factors in pecan production; however, less than 20 varieties have sustained long-term acceptability. Some of these include Western, Stuart, Desirable, Wichita, Pawnee and Caddo.

Cultural practices expanded greatly after WWII with pecan



production changing from a relatively simple effort to grow a crop into an intensive management system by the early 1980s.

2. SUMMARY OF MANAGEMENT SYSTEMS USED IN COMMERCIAL PECAN PRODUCTION IN TEXAS

Nursery production is very limited with less than 10 major companies propagating trees for sale. Seed are harvested, stored, stratified, planted in nursery beds or containers, grown for one or two years, grafted and sold the following dormant season.

Orchard establishment involves site evaluation, site preparation, facilitating surface drainage, irrigation establishment, marking rows for tree placement, planting, irrigating, controlling weeds, fertilizing, spraying foliar zinc, central leader tree training, preventing foliage and nut fungi, and killing or preventing leaf feeding insects, rodents and wildlife.

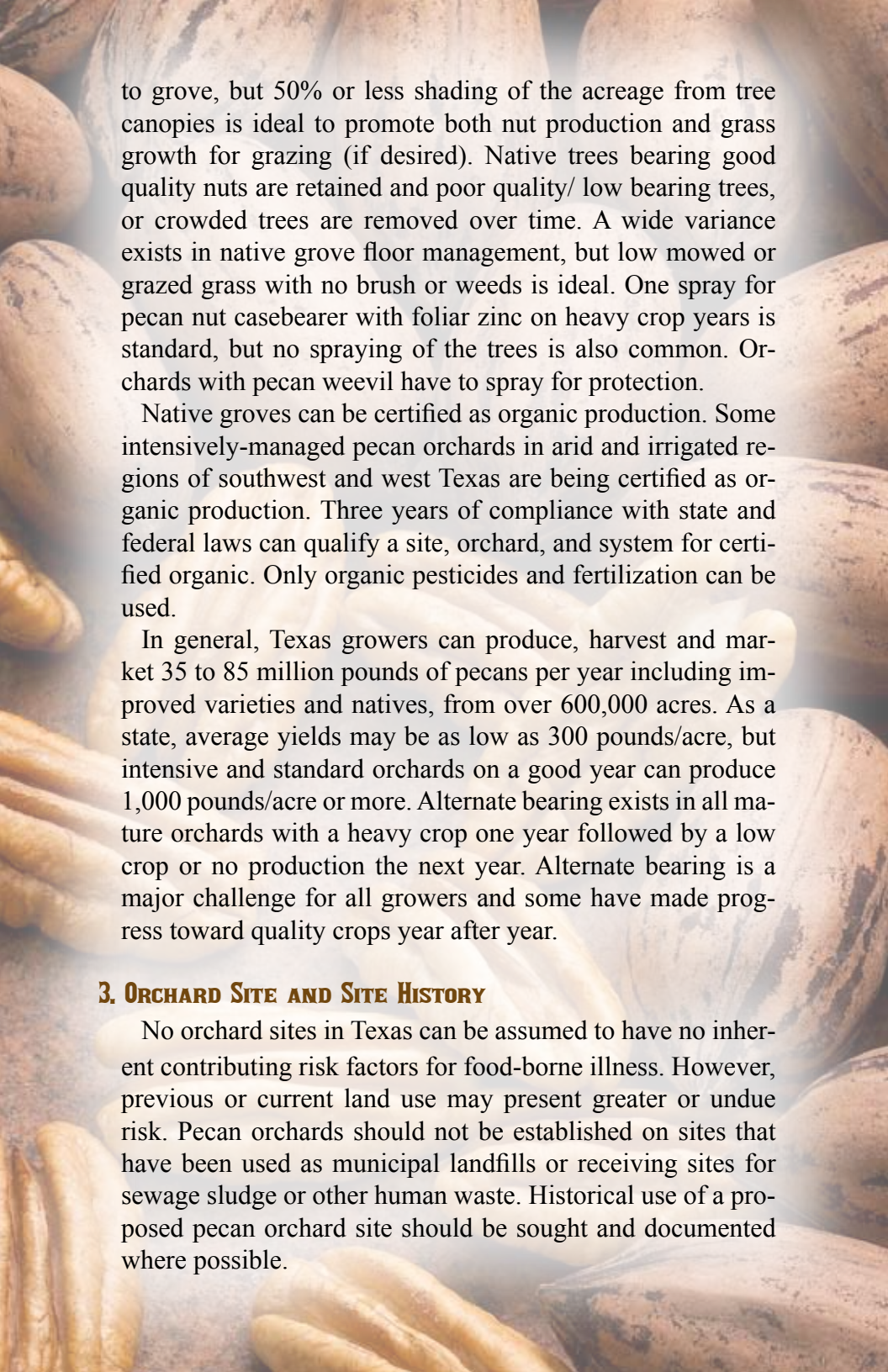
Wide variance exists in pecan management systems within Texas pecans. In general, at least four systems are used: intensive, standard, minimal and native management.

Intensive management includes improved varieties on deep, well drained soils with irrigation, herbicides, controlled nitrogen fertilization, foliar zinc sprays, stress/crop load management via trunk shaking, IPM, tree crowding management via tree removal or mechanical hedging, and mechanical harvesting.

Standard management includes improved varieties on deep soil with occasional irrigation, sod orchard floor, nitrogen fertilization on heavy crop seasons, at least one foliar zinc spray in early season, no crop load management, minimal IPM, spacing variance from wide to over-crowded, tree age variance from 10 years to trees over 75 years of age, harvesting varying from hand to semi-mechanical to full mechanical harvesting.

Minimal management involves mowing the orchard sod floor in years with a crop and harvesting.

Native pecan orchard tree spacing varies greatly from grove



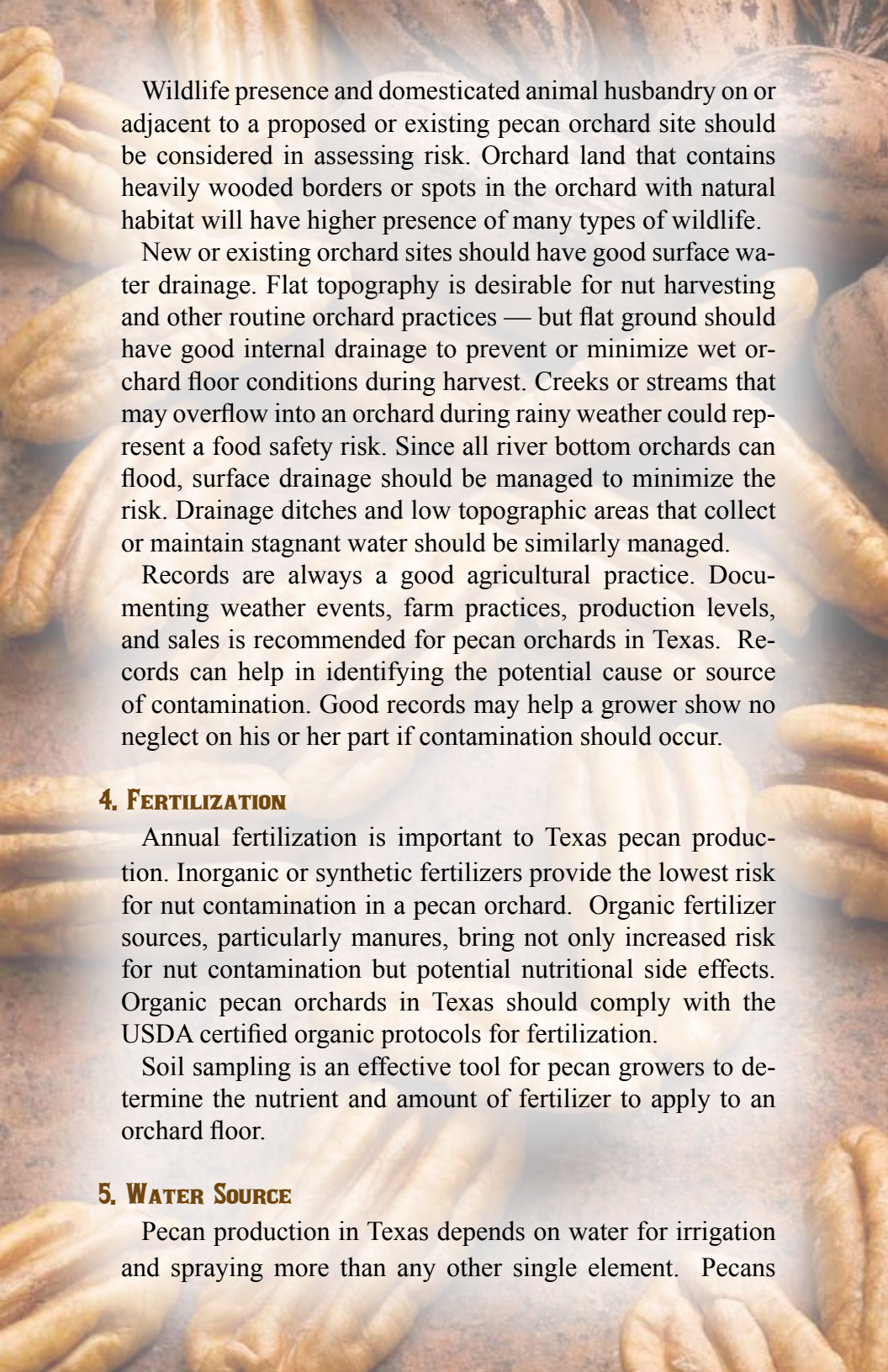
to grove, but 50% or less shading of the acreage from tree canopies is ideal to promote both nut production and grass growth for grazing (if desired). Native trees bearing good quality nuts are retained and poor quality/ low bearing trees, or crowded trees are removed over time. A wide variance exists in native grove floor management, but low mowed or grazed grass with no brush or weeds is ideal. One spray for pecan nut casebearer with foliar zinc on heavy crop years is standard, but no spraying of the trees is also common. Orchards with pecan weevil have to spray for protection.

Native groves can be certified as organic production. Some intensively-managed pecan orchards in arid and irrigated regions of southwest and west Texas are being certified as organic production. Three years of compliance with state and federal laws can qualify a site, orchard, and system for certified organic. Only organic pesticides and fertilization can be used.

In general, Texas growers can produce, harvest and market 35 to 85 million pounds of pecans per year including improved varieties and natives, from over 600,000 acres. As a state, average yields may be as low as 300 pounds/acre, but intensive and standard orchards on a good year can produce 1,000 pounds/acre or more. Alternate bearing exists in all mature orchards with a heavy crop one year followed by a low crop or no production the next year. Alternate bearing is a major challenge for all growers and some have made progress toward quality crops year after year.

3. ORCHARD SITE AND SITE HISTORY

No orchard sites in Texas can be assumed to have no inherent contributing risk factors for food-borne illness. However, previous or current land use may present greater or undue risk. Pecan orchards should not be established on sites that have been used as municipal landfills or receiving sites for sewage sludge or other human waste. Historical use of a proposed pecan orchard site should be sought and documented where possible.

The background of the entire page is a close-up, artistic photograph of several pecans. The nuts are arranged in a somewhat circular pattern, with their characteristic ridged, scaly shells and smooth, light-brown, pointed kernels visible. The lighting is soft, highlighting the textures of the shells and the smoothness of the nuts.

Wildlife presence and domesticated animal husbandry on or adjacent to a proposed or existing pecan orchard site should be considered in assessing risk. Orchard land that contains heavily wooded borders or spots in the orchard with natural habitat will have higher presence of many types of wildlife.

New or existing orchard sites should have good surface water drainage. Flat topography is desirable for nut harvesting and other routine orchard practices — but flat ground should have good internal drainage to prevent or minimize wet orchard floor conditions during harvest. Creeks or streams that may overflow into an orchard during rainy weather could represent a food safety risk. Since all river bottom orchards can flood, surface drainage should be managed to minimize the risk. Drainage ditches and low topographic areas that collect or maintain stagnant water should be similarly managed.

Records are always a good agricultural practice. Documenting weather events, farm practices, production levels, and sales is recommended for pecan orchards in Texas. Records can help in identifying the potential cause or source of contamination. Good records may help a grower show no neglect on his or her part if contamination should occur.

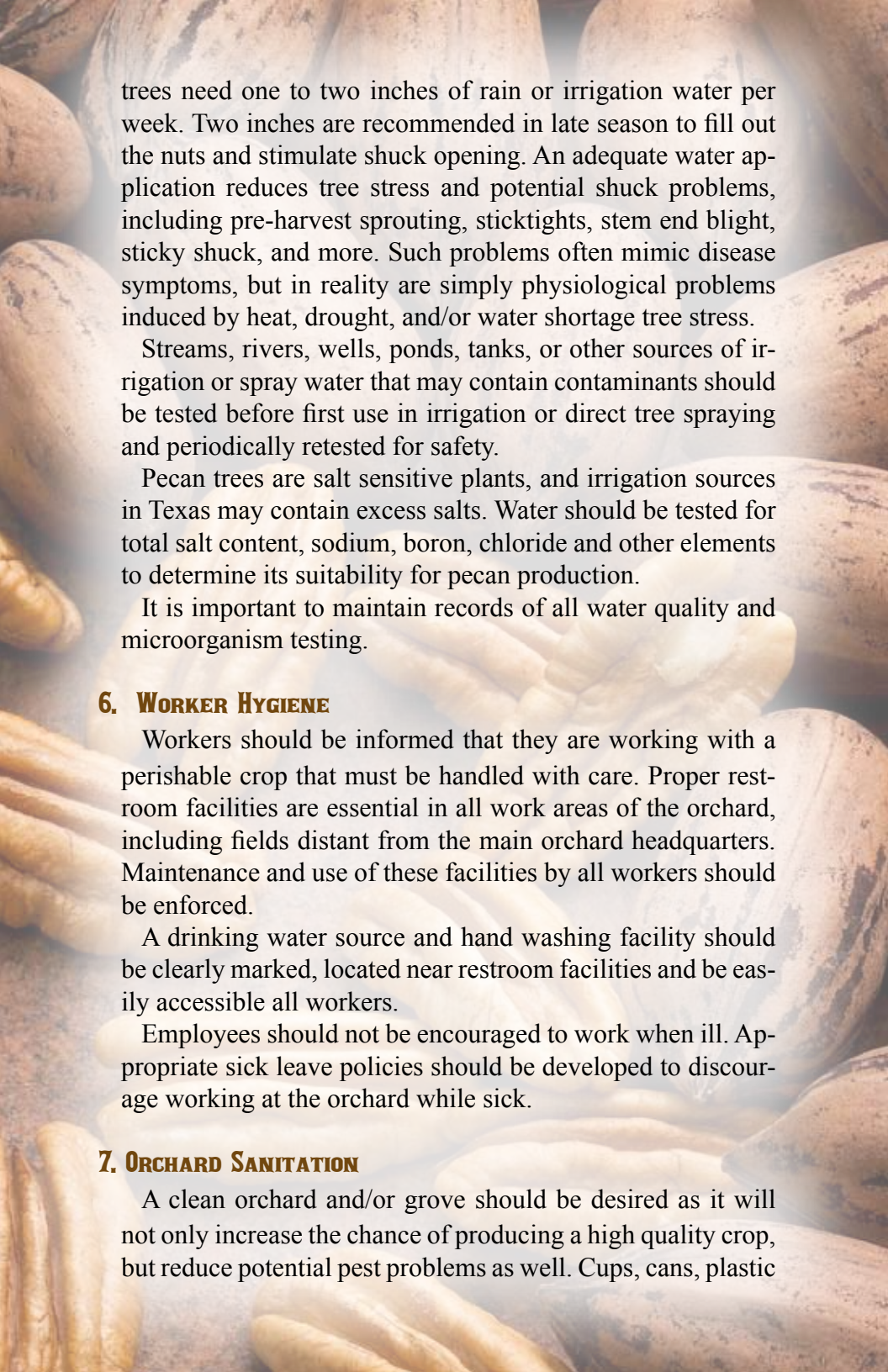
4. FERTILIZATION

Annual fertilization is important to Texas pecan production. Inorganic or synthetic fertilizers provide the lowest risk for nut contamination in a pecan orchard. Organic fertilizer sources, particularly manures, bring not only increased risk for nut contamination but potential nutritional side effects. Organic pecan orchards in Texas should comply with the USDA certified organic protocols for fertilization.

Soil sampling is an effective tool for pecan growers to determine the nutrient and amount of fertilizer to apply to an orchard floor.

5. WATER SOURCE

Pecan production in Texas depends on water for irrigation and spraying more than any other single element. Pecans



trees need one to two inches of rain or irrigation water per week. Two inches are recommended in late season to fill out the nuts and stimulate shuck opening. An adequate water application reduces tree stress and potential shuck problems, including pre-harvest sprouting, sticktight, stem end blight, sticky shuck, and more. Such problems often mimic disease symptoms, but in reality are simply physiological problems induced by heat, drought, and/or water shortage tree stress.

Streams, rivers, wells, ponds, tanks, or other sources of irrigation or spray water that may contain contaminants should be tested before first use in irrigation or direct tree spraying and periodically retested for safety.

Pecan trees are salt sensitive plants, and irrigation sources in Texas may contain excess salts. Water should be tested for total salt content, sodium, boron, chloride and other elements to determine its suitability for pecan production.

It is important to maintain records of all water quality and microorganism testing.

6. WORKER HYGIENE

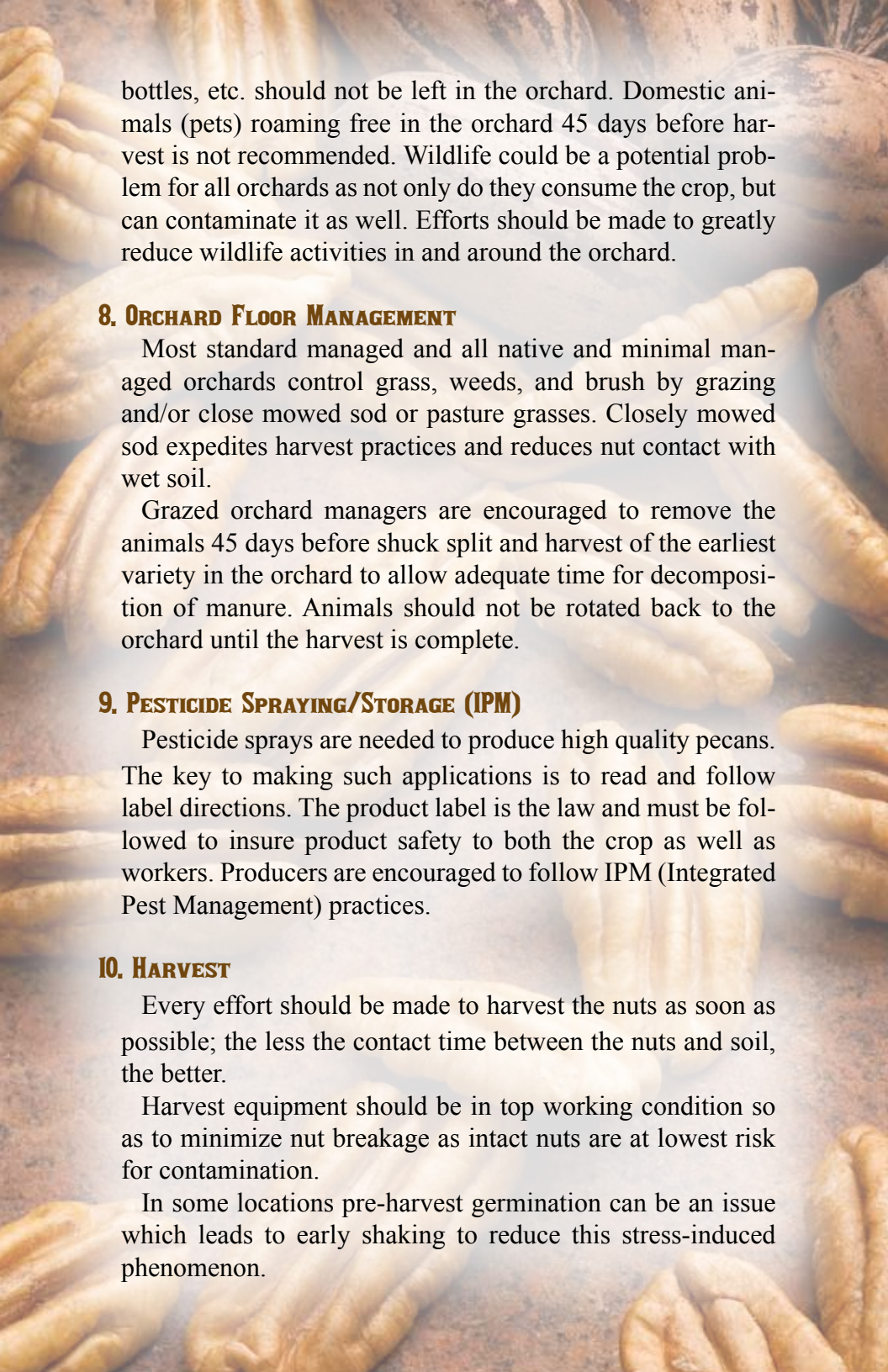
Workers should be informed that they are working with a perishable crop that must be handled with care. Proper restroom facilities are essential in all work areas of the orchard, including fields distant from the main orchard headquarters. Maintenance and use of these facilities by all workers should be enforced.

A drinking water source and hand washing facility should be clearly marked, located near restroom facilities and be easily accessible all workers.

Employees should not be encouraged to work when ill. Appropriate sick leave policies should be developed to discourage working at the orchard while sick.

7. ORCHARD SANITATION

A clean orchard and/or grove should be desired as it will not only increase the chance of producing a high quality crop, but reduce potential pest problems as well. Cups, cans, plastic



bottles, etc. should not be left in the orchard. Domestic animals (pets) roaming free in the orchard 45 days before harvest is not recommended. Wildlife could be a potential problem for all orchards as not only do they consume the crop, but can contaminate it as well. Efforts should be made to greatly reduce wildlife activities in and around the orchard.

8. ORCHARD FLOOR MANAGEMENT

Most standard managed and all native and minimal managed orchards control grass, weeds, and brush by grazing and/or close mowed sod or pasture grasses. Closely mowed sod expedites harvest practices and reduces nut contact with wet soil.

Grazed orchard managers are encouraged to remove the animals 45 days before shuck split and harvest of the earliest variety in the orchard to allow adequate time for decomposition of manure. Animals should not be rotated back to the orchard until the harvest is complete.

9. PESTICIDE SPRAYING/STORAGE (IPM)

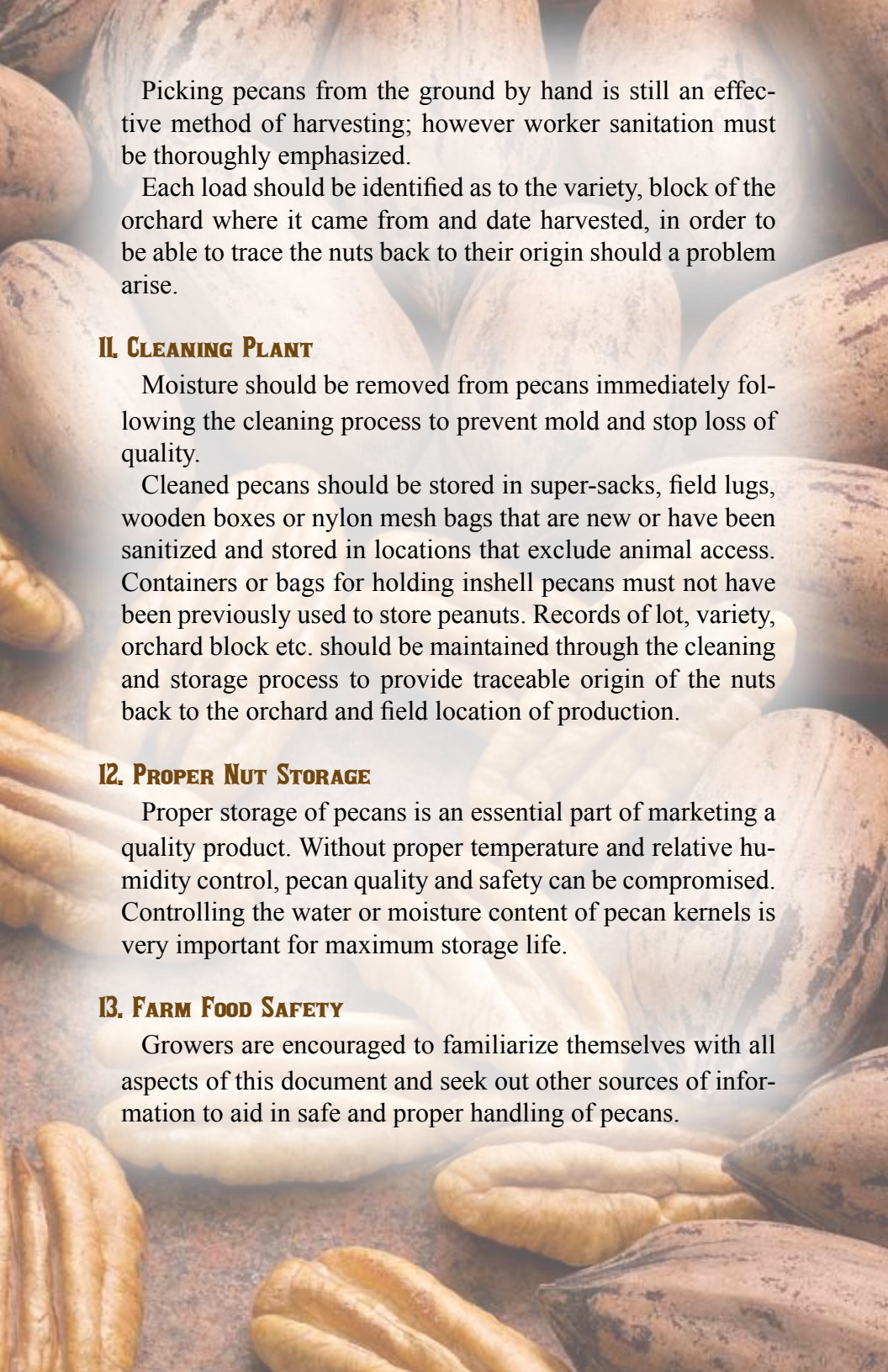
Pesticide sprays are needed to produce high quality pecans. The key to making such applications is to read and follow label directions. The product label is the law and must be followed to insure product safety to both the crop as well as workers. Producers are encouraged to follow IPM (Integrated Pest Management) practices.

10. HARVEST

Every effort should be made to harvest the nuts as soon as possible; the less the contact time between the nuts and soil, the better.

Harvest equipment should be in top working condition so as to minimize nut breakage as intact nuts are at lowest risk for contamination.

In some locations pre-harvest germination can be an issue which leads to early shaking to reduce this stress-induced phenomenon.

The background of the entire page is a close-up photograph of several pecans. Some are in their dark, textured shells, while others are shelled, showing their light-colored, ribbed kernels. The lighting is soft, highlighting the natural textures and colors of the nuts.

Picking pecans from the ground by hand is still an effective method of harvesting; however worker sanitation must be thoroughly emphasized.

Each load should be identified as to the variety, block of the orchard where it came from and date harvested, in order to be able to trace the nuts back to their origin should a problem arise.

II. CLEANING PLANT

Moisture should be removed from pecans immediately following the cleaning process to prevent mold and stop loss of quality.

Cleaned pecans should be stored in super-sacks, field lugs, wooden boxes or nylon mesh bags that are new or have been sanitized and stored in locations that exclude animal access. Containers or bags for holding inshell pecans must not have been previously used to store peanuts. Records of lot, variety, orchard block etc. should be maintained through the cleaning and storage process to provide traceable origin of the nuts back to the orchard and field location of production.

12. PROPER NUT STORAGE

Proper storage of pecans is an essential part of marketing a quality product. Without proper temperature and relative humidity control, pecan quality and safety can be compromised. Controlling the water or moisture content of pecan kernels is very important for maximum storage life.

13. FARM FOOD SAFETY

Growers are encouraged to familiarize themselves with all aspects of this document and seek out other sources of information to aid in safe and proper handling of pecans.

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