

In the Winter

Grow Green Manure Crops

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Most soils need organic matter to be productive and in good tilth. Our warm climate and intensive cultivation in Arizona literally burn up the organic matter in our soils. A long-term rotation, including several years of a perennial crop such as alfalfa, is the usual means of maintaining soil organic content.

But this practice is not always possible. Green manure crops offer a means of rapid build-up of the organic matter supply in soils as well as adding—in the case of legumes—valuable nitrogen.

In Arizona green manure crops may be grown in either summer or winter. Where the water supply or cost may be a limiting factor in their use, winter green manure crops are preferable. Less water is generally required for their growth.

Green manure crops have been tested at the University of Arizona Experiment Stations for many years. Recently we have tested a large number of these crops as a part of a national screening program. These trials have been in cooperation

**These Papago peas show good
nodule formation on the roots.**



with the Forage and Range Section of the Agricultural Research Service, U. S. Department of Agriculture.

Several kinds of winter peas, vetches, lupines and Egyptian clover were included in the tests at the University Experiment Stations at Mesa, Safford and Yuma. The varieties and strains, planted in late fall, have been compared on the basis of (1) yield and (2) nitrogen content of the aboveground part of the plants, when harvested at early, mid- and late spring (March 15 to May 1).

Papago Peas Best

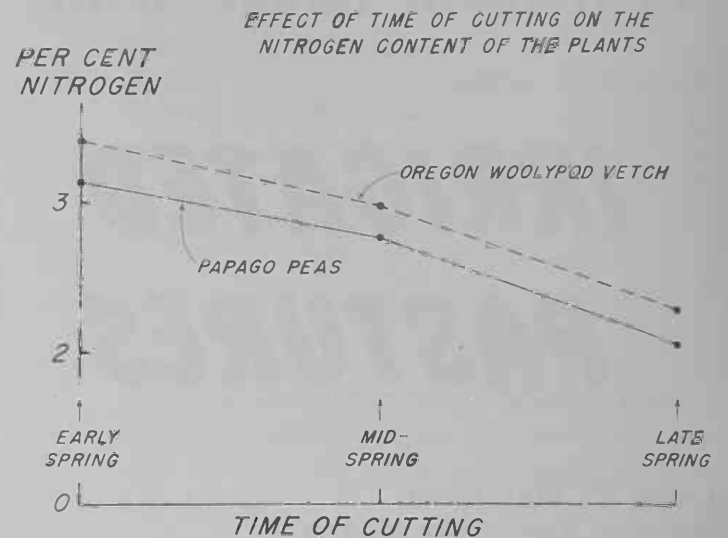
The Papago pea, a crop native to Arizona, has given the best performance of all winter green manure strains tested. Its closest competitor has been Oregon woolypod vetch which equaled the yield of Papago peas in the mid-spring cuttings. The lupines proved to be of no value in our area. The table presented here gives a comparison of the yields of some of the winter peas and vetches tested. Yields of other varieties have been figured on the basis of how productive they were compared with Papago peas.

Relative Dry Matter Yields of Winter Green Manure Crops (Average of 1955 and 1956)

Variety	Time of Cutting		
	Early Spring	Mid-spring	Late Spring
(Yield in percent of Papago peas)			
Winter Peas			
Papago	100	100	100
Austrian	91	84	78
Romack	94	92	82
Vetches			
Hairy	42	44	56
Oregon Woolypod	92	102	93
Purple	53	58	54

Plot yields of Papago peas calculated as pounds of dry matter per acre

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Another benefit from green manure crops is the nitrogen they add to the soil. The nitrogen-fixing bacteria found in the nodules on roots of legumes absorb nitrogen from the air. The bacteria change this nitrogen into a form which can be used by other plants when the green manure crop is plowed under and decomposed.

R. B. Streets has described still another use for a winter green manure crop (Papago peas) in his article, "Farming Root Rot Infested Land," in *Progressive Agriculture* Vol. 1, No. 4, 1950.

The nitrogen contents of Papago peas and Oregon woolypod vetch at three times of harvest are shown in the graph. It is apparent that as the time of cutting (plowing under, if in a farmer's field) was delayed the nitrogen percentage in the tops decreased. The total amount of nitrogen contained in the plants increased, however, as the date of harvest was delayed because of the greater amount of dry matter present in the more mature plants.

Thus the total nitrogen produced by Papago peas on a basis of the calculated acre yields of dry matter was 109, 171 and 226 pounds for early, mid-spring and late cuttings, respectively. At the time the last harvest was made the pods of the Papago peas were well filled, but still green. Pods were forming on the later-maturing vetch.

Frost at Higher Elevations

On the basis of our tests to date Papago peas are the best selection of a green manure crop for elevations up to 1,500 feet in southern Arizona. At higher elevations the danger of serious frost damage makes this crop hazardous. Additional information is needed before recommendations can be made for the higher elevations. The annual sweet clovers and small grains are probably the best green manure crops for such locations.

See your County Agricultural Agent for information on cultural practices for Papago peas.