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Fallow Reduction Activities under Dryland Conditions in Turkey

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Abstract. Turkey includes a number of agro-ecological zones due to its extreme geo-climatic diversity which permits a wide range of crops to be grown under both rainfed and irrigated conditions. Wheat and barley, the traditional crops, used to be grown in rotation with fallow almost in every region not only due to the limited rainfall but because of the long tradition as well. Two development projects aimed at the utilization of fallow areas: the Corum-Cankiri Rural Development Project (CCRDP) which began in 1976, and the Reduction of Fallow Areas (NAD) started in 1983. The most important achievement of the agricultural component of the CCRDP was the utilization of the fallow areas. Within five years a legume-wheat rotation system was largely adopted by the farmers through the efforts of the new extension service established for this project. This led to a government policy commitment to the establishment of a viable and on-going extension service. Starting from 1984, the Government of Turkey has introduced improved extension services through the World Bank supported Agricultural Extension and Applied Research Projects. The NAD Project based on the achievements of the CCRDP was very effective in reducing the fallow areas. As a result of project activities, the land use intensity had increased on a sustainable basis and food legume production increased tremendously leading to a major world export market. NAD is an example of good diagnosis of farmers' problems, relevant and focused applied research, well formulated recommendations, efficient and effective extension of those, cooperative work of various government agencies and effective credit and price support system and a good project management.

I – The Agricultural Sector

Agriculture has always been important for the Turkish economy. Although declining in relative importance, in recent years (1985–88) the agricultural sector generated about 16% of total GDP and averaged about 21% of export earnings. In addition, clothing and textiles (based largely on domestic agricultural raw materials) represented 37% of exports in 1990, while other industries based upon agricultural raw materials generated about 16% of exports.

The country includes a number of agro-ecological zones due to its extreme geo-climatic diversity which permits a wide range of crops to be grown under both rainfed and irrigated conditions. The economic and social activities carried out in the regions are directly affected by geography which leads to important regional differences.

In general, family farms dominate in Turkish agriculture. The most common type of land tenure is small land ownership. Most of the land holdings are too small to provide economically viable units. According to 1980 data, 61% of the households own farmlands of 5 hectares and less in size (Tekelioglu 1984). There are over 3.5 million private agricultural holdings, excluding those engaged solely in animal husbandry. Among owners, renting additional land is not common and is mainly done by large holdings. Sharecropping and renting are relatively unimportant compared to small landownership, and most rented and shared holdings are small (Kasnakoglu et al. 1990). Landholdings are highly fragmented and scattered. In 1970 the average number of parcels per holding was 5 and the average size was 1.1 ha. In 1980, these figures were 6.4 and 1 hectare respectively (Tekelioglu 1984). Fragmentation due to inheritance is preventing the efficient use of modern agricultural machinery and the application of soil conservation techniques thus reducing the efficiency in farm operation.

About 50% of the labor force in Turkey is engaged in agricultural activities, crops contributing for 56%, animal products 32%, forestry 7% and fisheries 4% of the income. *Population Census* data indicate that,

in 1985, 64% of the population engaged in agriculture was over 40 years old and that the literacy rate of the agricultural population was 67%. In small holdings women are the mainmast of the household; in addition to their classical role, they are also heavily involved in agriculture. According to 1990 statistics, females constitute half of the total agricultural labor force (DIE 1985; 1990). Mixed farming is the predominant system of agricultural operations in about 86% of all holdings. Most of the farmers—even the landless ones—keep the livestock not only for domestic consumption but for cash income as well. Although there are regional differences in mechanization, small farmers have a modest machinery park. According to the *Agricultural Census*, in 1980 over 60% of the households cultivating over 50% of agricultural land, used tractors. Of these a quarter owned the tractor used, 5% shared ownership and 70% rented tractor services (Kasnakoglu et al. 1990).

Wheat and barley, the traditional crops in Turkey, are grown in almost every region. Most of the wheat produced is winter wheat, primarily produced on the Central Anatolian Plateau, on its eastern and southeastern extensions and in Thrace. In these regions, fallow small grains has always been the primary cropping sequence for centuries. During the fallow period, following the wheat harvest, the field is left uncropped for 14 months to conserve moisture from two seasons of low rainfall, of about 350 mm/year. Fallow used to be practised almost in every region not only because of the limited and variable annual precipitation but due to long tradition as well. Therefore, the annual cropping intensities have been low in the drylands (Durutan 1990).

II – Extension Services

Turkey has an wide network of extension services. The Ministry of Agriculture and Rural Affairs has established Provincial Agricultural Directorates in 73 provinces and County Extension Offices in 829 counties. Agriculturalists, veterinarians, home economists, agriculture and animal health technicians (around 30,000) are employed as extension staff. However, such a long time the system operated rather inefficiently. Administrative matters have occupied a disproportionately large share of the time of extension agents. In addition to that, they have not been carrying out extension work according to sufficiently specific work programs. The links between the extension and research services were weak due to insufficient monitoring and evaluation. Therefore, the experience gained in the Corum-Cankiri Rural Development Project led to a government policy committment to the establishment of a viable and ongoing extension service. Starting from 1984, the Turkish Government has introduced improved extension services in 39 provinces through the World Bank supported Agricultural Extension and Applied Research Projects.

III – The First Attempt to Reduce Fallow Areas: the Corum-Cankiri Rural Development Project

The first attempt to utilize the fallow areas was made by the World Bank supported Rural Development Project. The project, which was started in 1976 covered two Central Anatolian provinces: Corum and Cankiri. In terms of economic and social development, these were ranked in the lower third of the 67 provinces of the country. Around 40% of the population were engaged in agriculture. Out of 2.1 million ha, only 900,000 ha were cultivated of which approximately 90% was rainfed. Rural infrastructure was undeveloped. Most of the farmers were small landholders whose incomes were below one-third the national per capita income level, constituting Turkey's target group for rural development.

During the implementation of the project, efforts were made to establish an intensive extension system to introduce improved cultivation and livestock management practices for increased production, mainly of small grains and forage crops to benefit some 80,000 farms. Another thrust of the project was to make additional land available by a reduction in the fallow area.

Since the existing extension service was found to be unreceptive to the concept of a new system, a project extension service was established parallel to it. All administrative and data collection functions were left to the existing service while the new unit devoted its time to assisting farmers.

At the provincial centers “Subject Matter Specialists" (SMSs), in counties “County Extension Agents" (CEAs) and in the villages “Village Agents" (VAs) had been recruited and a T&V system was established. As a result of effective training, demonstration programs and regulated visits, significant changes were observed in crop and livestock production.

The most important achievement of the agricultural component of the project was the utilization of the fallow areas. Benefits of legumes in the rotation system were demonstrated to the farmers through an intensive program. Within a short period of time, farmers were greatly attracted to the legume production as an alternative to fallow. Within five years a legume-wheat rotation system was largely adopted: legume acreage increased and fallow areas decreased remarkably (*Figures 1, 2 and 3*). Availability of credits accelerated the adoption process (Okcu 1981).

On the whole, the project accomplished significant contribution to the integrated development of project provinces. However, the extension service which was very effective in establishing close contact with the farming community was found to be the most productive component of the project.

IV – The National Project: Reduction of Fallow Areas (NAD)

The successful results obtained by the Rural Development Project and the “National Symposium on the Utilization of Fallow Areas” organized by the National Research Council (TUBITAK) in 1981 created the momentum for a national project: the Reduction of Fallow Areas (NAD). This project which was initiated in 1982 with the Ministerial Decree aimed at: i) increasing the land use intensity on a sustainable basis and diversifying the arable land use pattern, ii) providing soil and moisture conservation, iii) reducing the rural-out migration by providing a more efficient use of the existing labor force in the village, iv) supporting the livestock production in the farming system through the production of forage crops and by-products.

At the beginning of the NAD project there were two questions to be answered: i) under which ecological conditions could fallow be safely eliminated? ii) What are the most suitable and profitable crop rotation systems that would not depress the wheat yields?

The potential areas where fallow could be safely reduced were determined by analyzing the previous research data, meteorological data and farmers’ practices. A map indicating the fallow boundaries was produced by using an index which was modified later based on the data and observations developed (Guler et al. 1981; Guler and Karaca 1988). For the first phase of the project (1982–86), the implementation area was determined by grouping 14 provinces together and 15 more provinces were included in the project for the second phase (1987–94) (*Figure 4*). However, in areas where summer temperatures are very high and where shallow (40–60 cm) soils are common, it is recommended that farmers should shift to annual cropping since it is not possible to achieve adequate moisture accumulation at the seeding zone under these conditions (Yesilsoy 1981; Aktan 1981). Given previous research data, the experience of the Corum-Cankiri Rural Development Project and other observations, farmers were encouraged to grow perennial forage (sainfoin) in areas with a slope of more than 8%. In 1989, oil crops were included by Ministerial Decree in order to fulfill the demand for vegetable oils.

In order to reach the target and expedite the adoption process, some incentives were meant to encourage producers. On account of the great interest of the farmers in legume production, the government adopted support prices for these crops (1970) which provided them buying guarantee by the Turkish Grain Board (TMO). Farmers were entitled to obtain seed purchase and fertilizer credits.

The project integrated agricultural extension and applied research. In the beginning, the extension staff that would be responsible for its implementation were determined for all levels. Work programs were prepared on various activities like determining input requirements, providing and distributing them, arrangements for credits, carrying out field demonstrations, the organization of field days, the preparation of information materials for farmers, and monitoring and evaluation. To carry out their various activities, the extension staff established strong linkages with numerous agencies like the Agricultural Bank, the General Directorate of Agricultural Enterprises, Agricultural Sales Cooperatives, the Turkish Grain Board, and research institutes.

In order to manage such resources like soil, moisture, crops and livestock successfully and to maintain and improve their production capacity, the NAD project required the contribution of research institutes regarding: i) variety improvement, ii) crop production systems and iii) crop management practices. The project aimed to provide farmers with a range of options likely to fit their economic and environmental situations (*Figure 5*). Six research institutes that would be responsible for developing recommendations on fallow reduction were appointed.

With the initiation of the project, special emphasis was placed on crop rotation research. The Field Crop Research Institute is the main institute which makes an effort to present options to the farmers. Data obtained from two-year rotation research indicated that: i) winter sown legumes and cumin were the crops that use the lowest amount of water among the crops tested; ii) Hungarian vetch was the best crop that used the soil moisture most efficiently in case of cut for hay; iii) chickpea used the soil moisture most efficiently compared to other grain crops tested; iv) at the wheat seeding time, highest amount of moisture was determined in fallow plots and it was followed by Hungarian vetch and winter lentil; v) highest wheat yield was achieved by fallow-wheat rotation, however, Hungarian vetch caused only 3% yield decrease in wheat; vi) fallow practice significantly increased the ET compared to annual cropping, vii) highest WUE was obtained from chickpea-wheat rotation (Karaca 1989). The data on nitrogen status showed that ammonium nitrogen provided legumes was at least as much as fallow (Meyveci, and Munsuz 1987).

Numerous experiments have been carried out to determine the alternative crop management packages for different economic conditions, different soils and different managerial skills. The management package is considered important for both crops in the rotation. Therefore, efforts are made to determine the various components of the management package starting from soil tillage to the harvest. An appropriate seedbed preparation system, the seeding method including date and rate, the fertilizer application (method, time, rate and type of fertilizer to be used) and integrated pest management (particularly weed control) have been studied to optimize the management in ways that provide acceptable levels of sustainable crop yield (Kalayci 1987; Karaca et al. 1989a,b; Durutan et al. 1989).

The agronomy team of the Field Crop Research Institute puts special emphasis on seedbed preparation in the rotation system and conducted many experiments like seedbed preparation in various systems to provide farmers with a range of options that can best fit their ecological (climate, soil, topography) and socio-economic (farm size, labor availability, equipment park, access to markets, etc.) conditions. The results of these studies are being transferred to the extension staff through monthly workshops, adaptive research trials and demonstrations.

A number of training programs (theoretical and practical) were organized for the appointed extension staff by the research scientists. Training of extension staff on various aspects helped them to develop self-confidence and expedite the process. Within that frame of work, many demonstrations were designed and carried out together with the research and extension contributing a lot to the success of the project.

Under NAD project, two different extension systems exist in the provinces. In 14 provinces, the T&V system has already been established by the World Bank supported “Agricultural Extension and Applied Research Project”. In other projects, the traditional extension system is prevailing. No evaluation has been made to determine the performance difference in these provinces.

V – The Results

According to 1990 data, NAD project has been carried out by about 4 million farmers in 168 counties of 29 provinces. Since the reduction of fallow areas become very popular among the farmers, the fallow practice has been gradually abandoned not only in the project areas but in many other locations as well. *Figure 5* shows the fallow area in 1991 compared with 1975 (before the Corum-Cankiri Rural Development Project) and in 1982 (before NAD Project).

In the same period, tremendous increases have been recorded in food legumes (lentils and chickpeas) production and export *(Figures 6, 7, 8 and 9)*. This has led to a major world export market. Turkey is now

one of the world's leading food legume exporters. However, similar achievements were not recorded for the feed legumes due to limited marketing incentives provided by the government, and partly due to ineffective extension. Efforts are needed for a better integration of crops and livestock in the farming systems.

Another significant change was observed in domestic demand. Consumption of lentils and chickpeas, as an alternative source for quality protein, increased tremendously parallel to the increase in production *(Figures 10 and 11)*. It has to be noted that TMO has developed as well as impressive publicity efforts via radio, TV, newspapers, and publishing cookbooks to expand the demand. On the other hand, lentil straw is considered very valuable as feed. Therefore, there is a rising demand for it. In recent years, its prices became higher than that of barley straw.

The fallow reduction project provides an example of: good diagnosis of farmers' problems, relevant and focused applied research, well formulated recommendations and their efficient and effective extension, cooperative work between various government agencies and effective credit and price support system, and a good project management.

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Figure 1. The reduction of fallow areas in Corum-Cankiri as a result of the project (Okcu 1981 ; Sahin 1981)

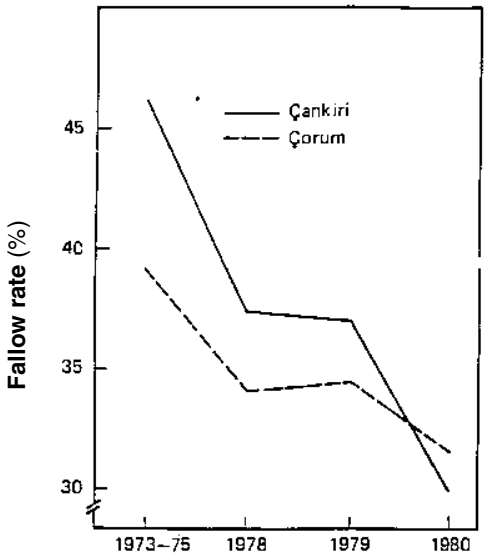

Figure 2. Increase in food and feed legume acreage (1000 ha) in Cankiri (Okcu 1981)

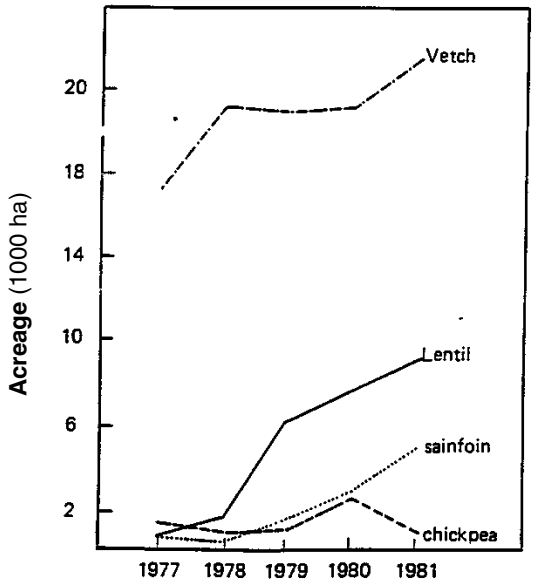

Figure 3. Increase in legume acreage (1000 ha) in Corum in project years (Sahin 1981)

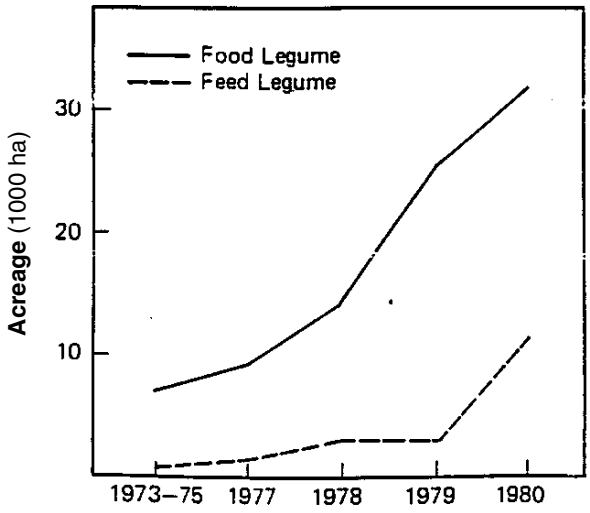

Figure 4. The project areas where fallow could be utilized

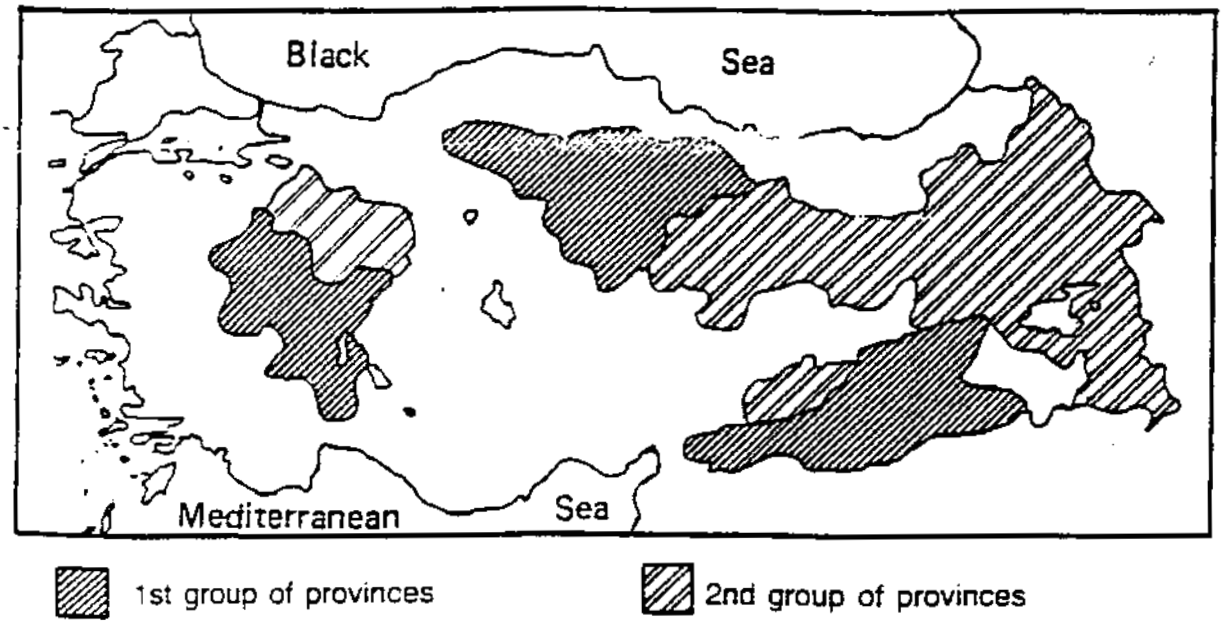

Figure 5. Cropping periods over 26 months

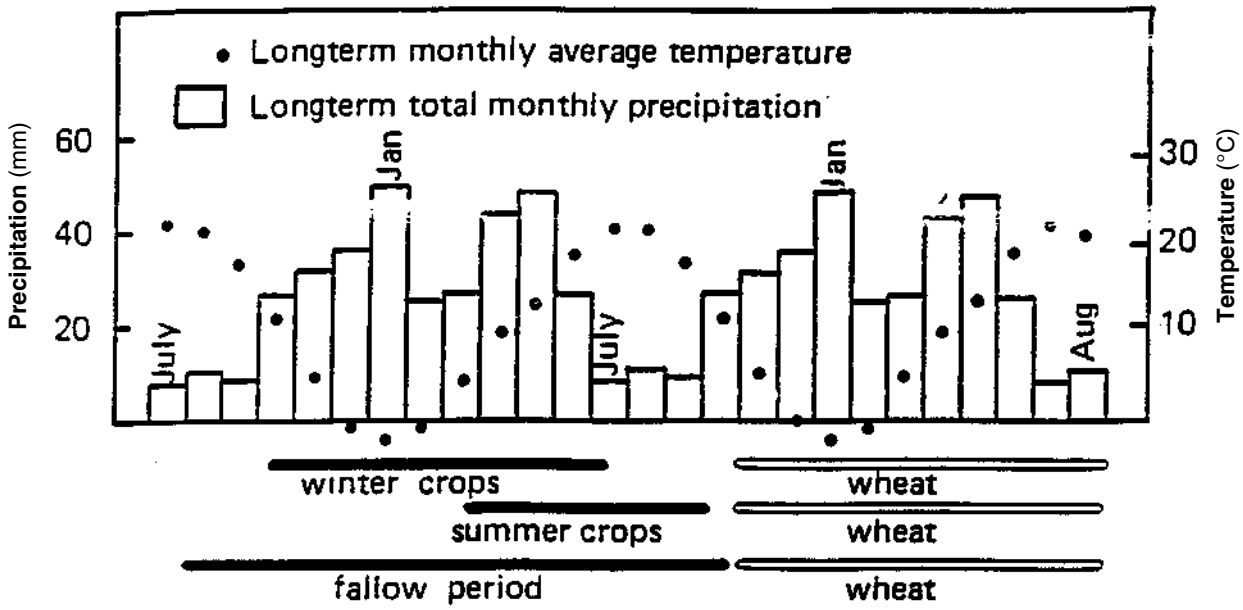

Figure 6. Progress in fallow reduction in Turkey

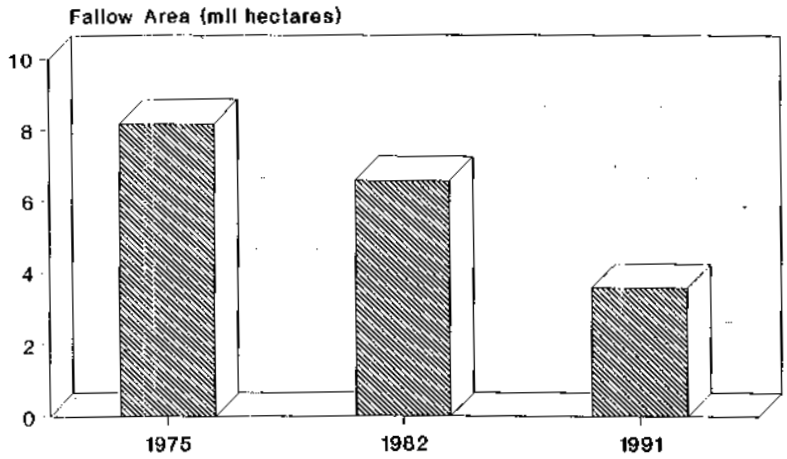

Figure 7. Increase in chickpea production in Turkey

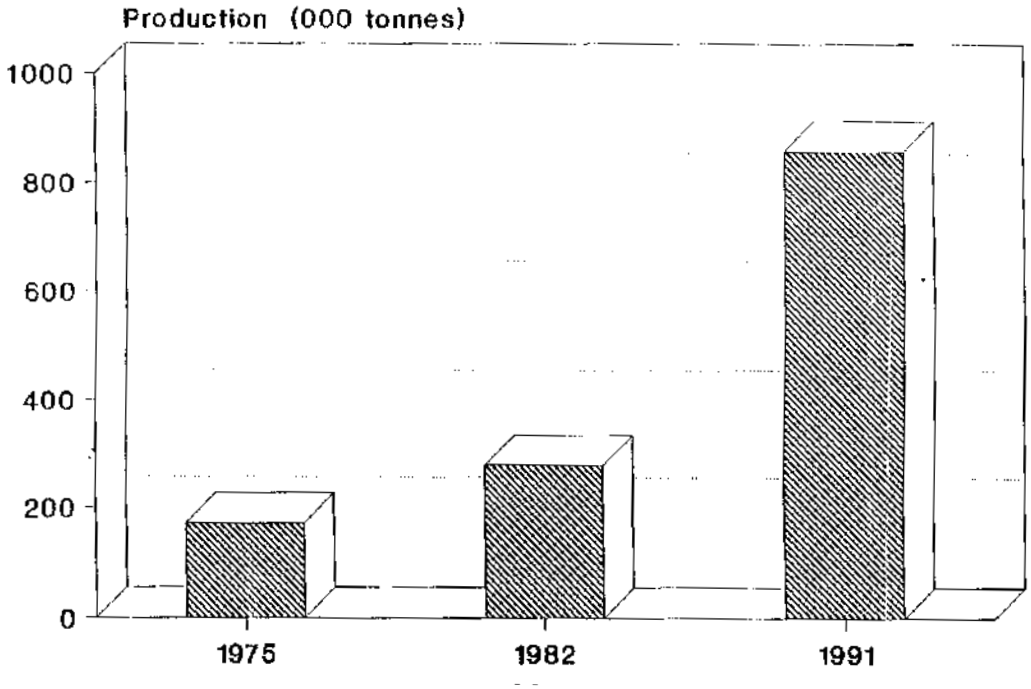

Figure 8. Increase in lentil production in Turkey

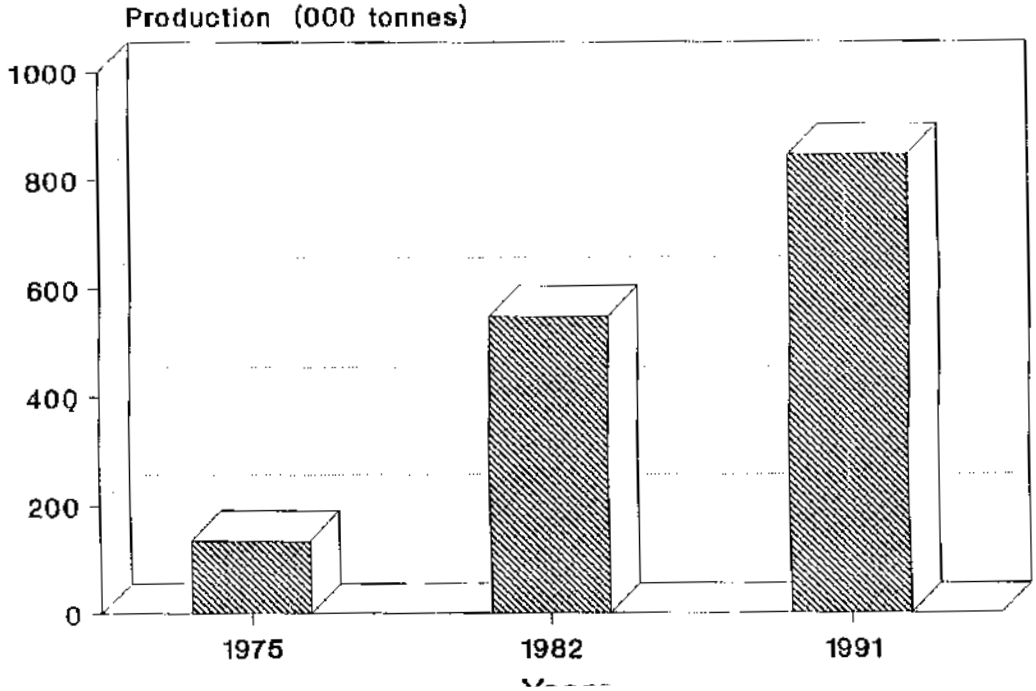

Figure 9. Increase in chickpea export in Turkey

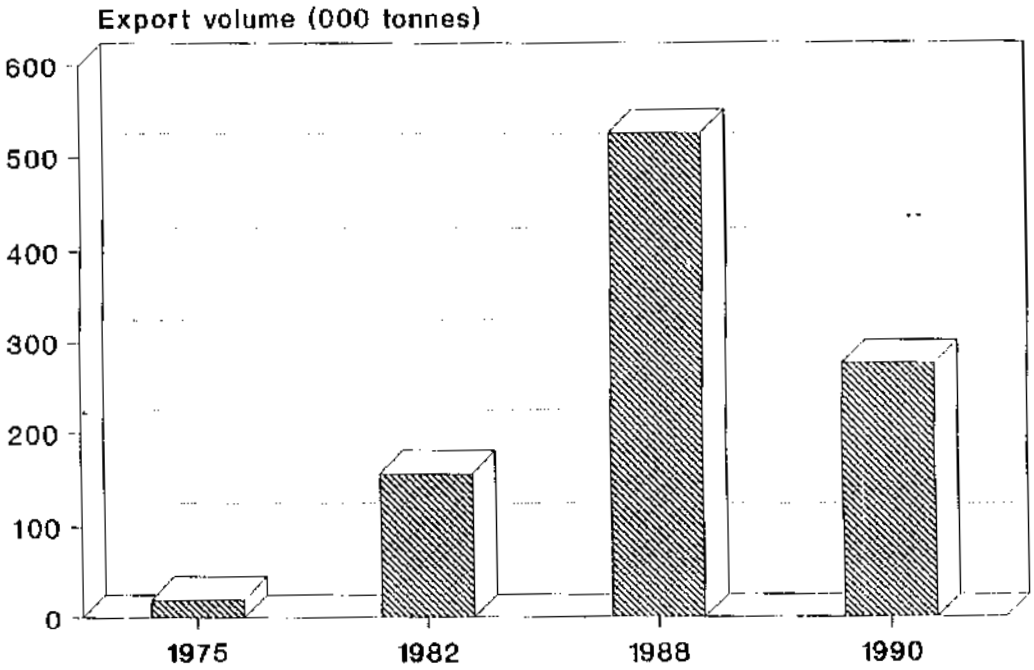

Figure 10. Increase in lentil export in Turkey

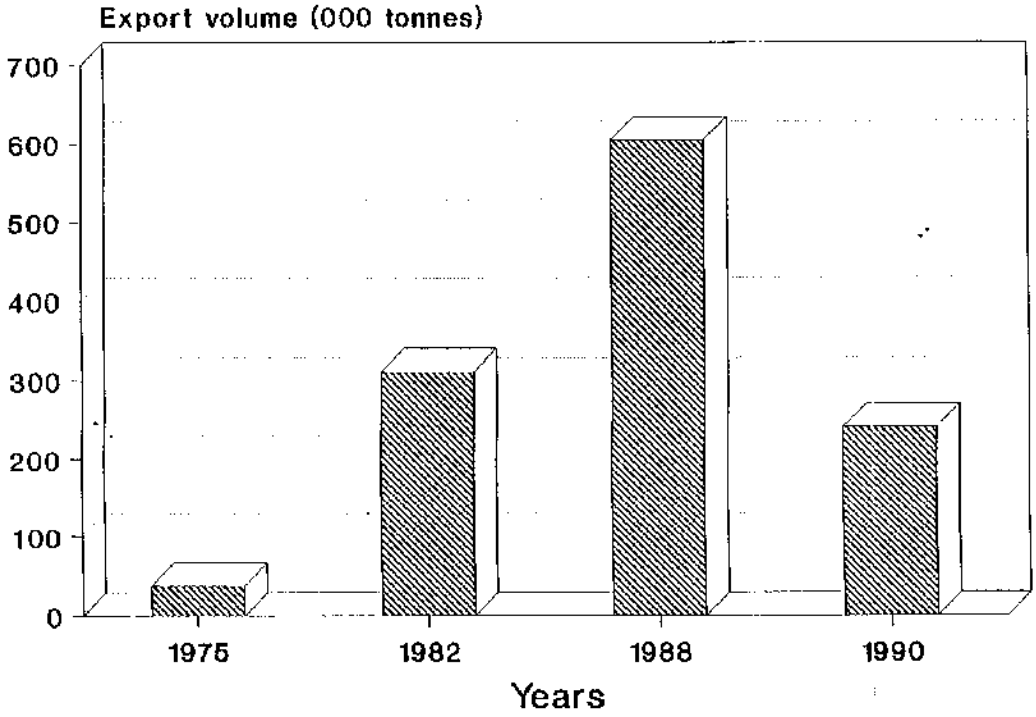

Figure 11. Increase in chickpea consumption in Turkey

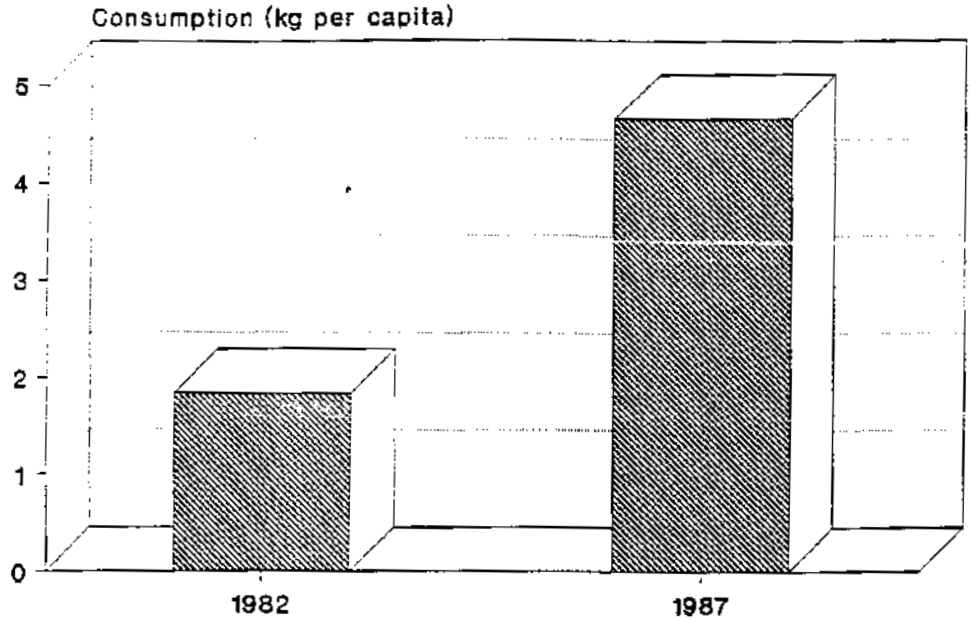

Figure 12. Increase in lentil consumption in Turkey