

QUALITY ENHANCEMENT PROGRAM IN SPAIN

Trip report July 11-18 1987

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1. EXECUTIVE SUMMARY

This trip was made for the purpose of promoting enhancement program in Spain. During our one week staying in major tobacco producing areas we visited 45 tobacco fields in four districts and several experimental plots. Some fields are very good, some are average and some are very poor. Some of the situations are due to factors beyond human control, and others are due to technical problems or poor farm management.

Spain has favourable nature conditions under which quality tobacco can be produced given adequate technical guidance and good management. Farmers have the incentive to produce tobacco for high profit. Government has initiated soil testing and variety improvement program which proved to be effective. Tobacco industry also demonstrated willingness to support.

Major problems include :

- (a) - production technology
- (b) - leaf quality
- (c) - marketing system
- (d) - training of technical and extension tobacco experts.

Many questions can be raised , for example :

- how to relate field cultural practices to desired nicotine, sugar, and aroma ?
- How to coordinate farmers, government and industry's mutual interest ?
- How to educate technical and extension people for problem solving ?
- How to increase products marketability ?

This report is prepared with those questions in mind, based on practical observations, discussions with farmers, government and industry experts. Much progress has been made in Spain tobacco during the past three years, and much more work needs to be done in the future. Joint efforts from all concerns are needed to achieve this goal.

The characteristics of tobacco production in Spain are described. Comments on field observations, whether general practice or special studies, are only preliminary in nature based on academic understandings and past experience. Data on chemical analysis and quality evaluation of cured leaf tobacco will provide additional basis for final interpretation.

Actions are recommended for the remainder of this crop season, as well as for future, long term consideration, toward the goal of quality enhancement in Spain.

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## 2. ACTIONS RECOMMENDED

- 2.1 During my 1984 trip to Spain, my recommendations placed emphasis on variety, location, culture, pest management, curing and handling on "fermented burley" tobacco. Those key points are also applicable on Virginia and burley tobaccos. Improvements made by Servicio Nacional on development of new varieties and application of fertilizers based on soil analysis are indeed very impressive and need to be continued.
- 2.2 ~~Many New varieties of Various tobacco types have been developed each with special characteristics.~~ Before the release of each variety to farmers for massive production, they should be tested, in comparison with selected standards, to determine respective leaf quality, and usability. This can be done jointly by research scientists, government and industry users.
- 2.3 Serious attention should be directed toward disease prevention particularly sanitation practices. Farmers, technicians must be educated on the importance of sanitation " house keeping " , beginning with seedbed, water source, tools hands, shoes, even clothing must be free from diseases. All plant residues, including leaf, root, stalks must be removed from field and destroyed. Even tobacco smoking in the field should be restricted.
- 2.4 Seedlings used for transplanting must be healthy, with fibrous root system and uniform in size. The very uneven appearance occurred in the tobacco field indicated that this has not been carefully observed.
- 2.5 Tobacco is transplanted to the field in May. Due to cold weather at that month, most plants have a prolonged period in the field without active growth. It may be desirable to experiment a " transplanted growth " under protected environment. Seedlings can be transplanted to small peat pots, or soil blocks and allow them to grow under plastic tent similar to greenhouses for a period of three or four weeks to stimulate fibrous root development and to overcome transplanting " shock ". They can later be placed in the open field when weather is warm for active growth. This is similar to Italian system and is being used by many other countries.

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- 2.6 Current Virginia tobacco produced in Spain is low in nicotine, high in sugar and weak in aroma. Many factors are involved in addition to variety itself. To increase nicotine level, plants must receive adequate supply of nitrogen also avoid over-irrigation. The most important operation is to top early. I strongly suggest to top at bud stage, keeping 18 leaves only each plant. After topping, suckering practice must be closely observed either with chemicals or by hand. This is not only for increase nicotine, but also for adequate development of upper leaves for a better quality.
- 2.7 In Virginia tobacco, sugar content should maintain at 16-20 % level. The climate condition in Spain such as long days and cold nights favours high carbohydrates accumulation. Dry matter weight in plant reaches maximum at full maturity, and gradually reduces when senescence begins. It is very important to attain a desirable sugar level by allowing leaves harvest at full maturity or even slightly over mature. At curing, allow sufficient time to complete changes within the leaf during yellowing period. In United States, mature leaf takes 60-72 hours for proper yellowing in comparison with a rather short period in other countries. U.S tobacco is known for high quality and aroma.
- 2.8 Keeping in mind that tobacco leaf is physiologically " alive " during maturity, senescence and " yellowing ". It has to be alive in order to conduct biochemical changes for desired quality and aroma. To maintain alive, it needs water to keep " turgidity " and enzymatic activities. Under dry field conditions leaves from later stage of harvesting usually have very low water content. Together with very low relative humidity in the air, it generally promotes quick drying or " kill " of the leaves. This would prevent the necessary chemical changes for quality tobacco. To avoid such adverse action, it is necessary to irrigate the field prior to leaf priming, and may also need to pour water on the floor of curing barn to build up needed moisture in the air.
- 2.9 Producing good aroma tobacco involves many factors. In addition to variety fertilizer, culture, it needs higher temperature during maturation to produce essential oils and other components relating to leaf aroma. Full mature in the field and complete yellowing process at curing again are essential. Biochemical changes taking place during the period produced degradation compounds

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including hydrocarbons, nitrogeneous fractions, etc, which are known to be aromatic, or may generat aroma materials through further reactions in subsequent treatment of leaf tobacco. This fact again emphasizes the absolute need for leaf maturity at harvesting and yellowing process during curing.

- 2.10 Farmers are generally willing to produce a better tobacco, when there is a price difference, and if they are told how to produce it. Temptations for a quick sale often leads to pre-mature harvesting and "flask" curing. I suggest that government should consider to delay the purchase of cured leaf until all tobaccos are harvested. In doing so, farmers have no reason to "rush" for quick sale. In addition, a broader difference on prices should be established to pay good quality, ripe tobacco. This involves create a practical grading system which is practical at tobacco market.
- 2.11 Intensive training for technicians and extension specialists on tobacco. They can in return train the tobacco farmers.
- 2.12 Many tobacco fields are too low, plants are lost by water lodging. Some fields with good tobacco growth, but have poor or no drainage system. In addition many fields have hard-pan which prevents healthy root development. These areas should either be avoided for tobacco production, or correction measures be made.
- 2.13 In areas of fermented burley, experiments can be conducted to use regular burley tobaccos into "fermentation" process as now practiced in Spain. It is very likely that regular burley can be used for this purpose, either through mild fermentation or by force aging.
- 2.14 Several studies can be added into the on-going "quality enhancement" program of this crop. In the population study, chemical examination on levels of nicotine nitrogen, sugar, etc, can be conducted from leaves of plants grown at different spacing. In another field, nitrogen was not applied until 25 days after transplanting. Plants at this field can be topped at 18, 20, or 22 leaf level to see the effect of prolonged or delayed growth.
- 2.15 Pesticides and herbicides usage in Spain are in a much higher rate than in USA, the prescribed rate. The reason given was due to lack of adequate equipment for application. In a few cases, there was plant damage. It is also a waste. Measures should be taken to correct this situation.

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### 3. CHARACTERISTICS OF NATURE CONDITIONS AND TOBACCO PRODUCTION IN SPAIN

In a five year plan ( 1986-1990 ) for Spain tobacco production, it was projected to increase Virginia tobacco from 9.6 million kg. to 17 million kg. burley from 5.0 million to 15 million, and to reduce black tobacco from 28.5 million to 5.9 million. Although this plan is on-hold temporarily, Spain has favourable nature conditions to produce quality Virginia and burley. Tobacco soils are sandy or sandy loam and silt loam, with  $pH$  4.8 to 5.2 (range 4.0-6.2). Top soil about 8" deep some has hard-pan which cause drainage problem. Generally the soil is low in Ca, Mg, K, B, Cu, Zn and N, abundant in P, Mn and Fe. Organic matter is about 1-1.5 %.

Rainfall is short during active growing period. Irrigation system for most fields is available. The Cl. constant in water from 80% of supply is below 30 ppm., which is acceptable. Sun light is abundant during growing season. July has almost 16 hours of daylight. Temperature differential is wide : for example, the max. temp. in June, July, August and September is 85, 91, 93 and 85°F, and min. is 57, 60, 58 and 53°F respectively. This wide variation between day and night temperatures favours accumulation of photosynthetic materials and less degradates. Low rainfall plus high temperature also resulted in high rate of evaporation and transpiration as well as low relative humidity.

The above mentioned nature conditions indicate that there is potential to produce good tobacco in Spain providing that sound management and good technical guidance are available.

Much progress has been made since my last trip to Spain in 1984. Fertilizer usage is following recommendations based on soil analysis. Plant population is generally adequate. New local varieties of Virginia and Burley have been developed. More contacts are being established with farmers.

Low temperature after transplanting delays plant development and growth. It takes 40 or more days for transplants to reach knee high. Plants in tobacco fields may take 165 to 170 days to complete harvest. Nicotine in bright tobacco is generally low and sugar is high, leaf aroma has not reached desired level. Other quality factors have room for improvement.

In 1987 field tobacco, mosaic virus appear to be very serious. Plants lack uniformity and too late in topping. Many fields are growing very good tobacco plants which would result in high grade leaves if they are harvested at good maturity and cured adequately.

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#### 4. FIELD OBSERVATIONS - GENERAL

- 4.1 In most fields tobacco plants are not even in growth. This indicates uneven seedlings were used, or seedbed was not prepared with good care.
- 4.2 Only a very few mixed plants were found in the field, suggesting a good seed maintenance program.
- 4.3 1987 tobacco field is heavily infested with mosaic virus diseases. The lost may reach 20 or 25 % of the total.
- 4.4 Topping in general is very late. Most fields are full of flowers. In addition, it is topped too high, generally with 22 leaves
- 4.5 Many new varieties are already been grown in the farm fields, although the exact chemical and physical characteristics are yet to be determined.
- 4.6 Fertilizer usage rates generally are very good, as it is suggested based on soil analysis. No deficiency symptoms were observed.
- 4.7 Pesticides and herbicides are widely used, at a level higher than recommended.

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5. FIELD OBSERVATIONS - QUALITY ENHANCEMENT PROGRAM

- 5.1 Hail caused severe damage at the variety testing plot of Virginia tobacco. It may be possible to select 10 or 20 good plants for comparison this year.
- 5.2 Plastic cover test appeared to show that plants may grow faster and develop better because of higher soil temperature and less moisture loss.
- 5.3 It is too early to observe the effects of spacing, topping and suckling as well as the degree of maturity and yellowing. Generally, it would be an academic demonstration rather than an unexpected finding.

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6. GENERAL COMMENTS

There are impressive progresses made in Spain in tobacco production since my last trip in 1984. Most prominent differences are use of calculated fertilizer based on soil analysis, development of varieties to meet the local needs, and addition of technical personnel for assisting farmers.

Spain can produce more and better tobacco in the future. It will need close coordination among farmers, government, research scientists and industry users. Improve quality is only the first step. Leaf tobacco must be produced, graded, and marketed as the market demands. Production practice, and marketing procedures should always change in adapting to change of time.

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APPENDIX

A. LIST OF CONTACTS AND ACTIVITIES DURING THE TRIP

- July 11 (Sat) : Flight to Madrid, Dale Smith, Steve Huggins
- July 12 (Sun) : Arrive Madrid. Dale Smith and Steve Huggins  
Situation briefing and tour planning
- July 13 (Mon) : Drove to Caceres with Dale Smith and Steve Huggins  
Visited Servicio Nacional de Cultivo y Fermentacion de Tabaco  
Talayuela factory. Discussed with Felix Texeira Quiros (agronomist)  
on general tobacco situation, particularly physiochemistry.  
Gen. Manager Jose Antonio Gonzalez Martin and four others joined  
visitation to two farms in Talayuela area.
- July 14 (Tue) : Same team visited 13 farms at Tietar and Santa Maria regions  
Dale Smith, Steve Huggins, Jose Antonio, Felix and 6 others.
- July 15 (Wed) : Same team plus others visited Casate Jaada region, six farms.  
Dale Smith, Steve Huggins, Jose Antonio, Felix, etc.
- July 16 (Thu) : Don Benito region, Medelin and Mengabril area. Dale Smith, Steve  
Huggins, manager Gregorio Garcia Calvo, and 6 others.
- July 17 (Fri) : Talayuela area experimental plots and farmers. Dale Smith, Steve  
Huggins, Jose Antonio, Felix and 6 others. Afternoon return to  
Madrid.
- July 18 (Sat) : Return to the States.

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## B. 1986 TOBACCO PRODUCTION IN SPAIN

(1.000 Kg)

	CACERES	BADAJOZ	GRANADA	CORDOBA	TOTAL
light (3)	11.500	280	1.200	1.000	13.980
virley	10.300	350	800	25	11.475
dark fermented virley)	11.000	500	5.006	300	16.806
	32.800	1.130	7.006	1.325	42.261

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C. VARIETIES OBSERVED IN CACERES AND BADAJOZ

1) VIRGINIA

Speight G-28 ; Mc Nair 944 ; Coker 176 ; K-326 ; EMH-2,3, EMH-5  
EMH varieties were developed by Wersman, all early mature.  
EMH-5 is mosaic resistant.

2) BURLEY

Ky-14 ; Ky 17  
Canalera 11 ( resistant to Fusarium wilt & root knot nematode)  
Canalera 4 ( similar to Canalera 11, High Nitrogen demand in field)  
Canalera 128.  
All Canalera varieties are developed by Wersman.

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