



Problems of Growing Cotton in Marginal Regions

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ABSTRACT

Bulgaria is among the most northerly cotton producing countries in the world. Hydrothermal conditions during the growing season put specific requirements on cultivars and production practices. Russia and the Ukraine intend to re-introduce cotton production based on Bulgarian experience and early maturing cultivars. The constraints will be even greater and it will require intensive breeding, physiological, cultivation, crop protection, economic and modeling research to overcome them. The development of site specific systems for low-input, sustainable cotton production in these countries is a big challenge and needs international cooperation, calling for the late3st achievements in current cotton research. Ways to meet these challenges and prospects for cooperation in cotton research are discussed.

Introduction

Cotton is a valuable crop offering income to the farmers, supplying many processing industries and providing vegetable oil and protein for animal and human consumption. Consequently, it is not always grown in the most favourable environments but also in regions with one or more adverse. These may be adverse soil (saline, acid, poor, stony, shallow to rock, with low moisture holding capacity), or adverse climatic conditions (extremes of precipitation, temperature, weather hazards), high insect infestations, or low level of agriculture. The result of individual or joint contributions of these factors adversely affects yield and quality. When cotton production persists in these regions or is being reintroduced after a long interval, good economic, agronomic or social reasons are indicated to justify it. This may be the need for a local product to supply an industry in order to save foreign exchange, it may be to provide employment for rural and urban families involved in growing and processing or the observance of some international obligations (e.g. conversion from food to non-food crop production in EU). Crop rotation may be necessary for phytosanitary reasons or because of the state of the market. However, the need to counteract the negative effects of the unfavourable conditions costs to the producers much effort and expenses. This makes cotton production in those regions marginal in the sense that its profitability is inconsistent and its less attractive than growing some other arable crops that are easier to manage. The task of the research is to make it biologically,

for eliminating the gaps. Of course, part of the problem may never be completely resolved, but a portion of it can be mitigated by developing appropriate

economically and socially sustainable. How can be this achieved?

Procedures

The first step should be a detailed analysis of the production situation to estimate the potential yields and how close the real yields approach them. Technological and economical bottlenecks of the production should be identified. Thereafter information about minimal and maximal economic yields and how much the gap between them can be broadened is very important. Recognition of the factors contributing to poor yield and quality is the next step: their character - permanent (soil characteristics, short season etc.) or temporary (drought, cool or hot spells, pest attacks), their intensity, duration, time span of the effect, as well as their consequences. Inventory and choice of the ways to alleviate the stress effects should follow: avoiding, escaping, withstanding or recovering strategy depending on the circumstances.

Two approaches to solving the problems exist and both deserve equitable and simultaneous consideration. One is the adaptation of the environment to the regimes through the plant requirements, i.e. control of temperature, water, and nutrient regimes through cultural practices; the other is adaptation of the plants to the existing conditions through plant growth regulation and breeding new varieties. To be able to successfully do this, comprehensive evaluation of the current knowledge of cotton development and of the experience of growing cotton in different environments is necessary, as well as the identification of research and development needs

management systems for adapted varieties. This is a formidable task presenting challenges and tempting opportunity for cotton researchers. Interdisciplinary,

inter-institutional and international co-operation would be needed in seeking unconventional ways to improve the profitability of growing cotton in marginal environments. It may be via yield and quality improvement, decrease in production costs or niche products for specific purposes and at special prices. Joint endeavours and joint facilities would be much more likely to result in opportune and novel solutions of the most pressing problems. This can lead to innovative changes in the production technology from which not only marginal but also conventional cotton production might benefit.

In the northern cotton producing regions above 42° N, the main obstacle for cotton production is the short and cool growing season that limits the potential yield and quality because of heat unit deficit, limited time span for plant development and the negative correlation between earliness, productivity and fiber quality. Specific models of the canopy, plant type and fruiting patterns need to be developed where the plant population would be a more important yield component than individual plant productivity potential. This could be improved by increasing boll weight rather than number of harvestable bolls; synchronizing fruiting and retention of the early fruits; improved germination and seedling resistance/tolerance to adverse weather conditions, rapid vegetative growth at the early stages and prevailing reproductive development afterwards, shortening the duration of the stages and increasing the rate of boll opening. These are main objectives and methods of accomplishing them are needed. Intensive physiological and genetic studies are needed to comprehend the complicated interrelations of traits and regulating mechanisms of the cotton plant and to make use of this understanding. Cotton problems once played a key role in some aspects of plant research and technologies. Insect problems necessitated and gave rise to resistance breeding, transgenic techniques, IPM. Marginal cotton growing can now give rise to new, unforeseen principles of plant research.

Non-Scientific Components

Non-scientific aspects of the problem are equally important. They comprise government cotton policies, co-operation between the sub sectors of the cotton industry, presence of a well organized and properly functioning extension service for farmer education and for rapid dissemination of recent research findings to practice, responsiveness of the producers to research and its stringent application, utilization of the by-products, optimizing the farming system, flexible marketing. These components would include the provision of crop financing for farmers and a marketing, transport, storage and ginning infrastructure. The involvement of the private sector in the initial stages would be problematical.

There is room for sharing competence and experience and a lot of work worth doing.

