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Trend of *Stylosanthes hamata* seed production in India

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Abstract
This study examines the trends and factors influencing Stylosanthes seed production in Anantapur district, Andhra Pradesh, a region characterized by arid conditions and low rainfall. The area under Stylosanthes cultivation increased significantly from 2011 to 2020, driven by its drought tolerance and suitability for rainfed lands. However, irrigated areas declined as farmers opted for more lucrative crops. Seed production showed a seven-fold increase, while seed yield and selling price exhibited minimal and volatile changes, respectively. The study highlights the importance of policy support and technological improvements to stabilize and enhance Stylosanthes seed production. Market volatility and government demand fluctuations were identified as key factors affecting seed prices. Overall, the research underscores the potential of Stylosanthes as a resilient crop for arid regions.

Introduction

Seed is the most critical input to enhance the production potential of all agricultural crops, including fodder. In India, fodder is produced from 8.34 million hectare of cultivated and 10.39 million hectares of permanent pasture. Fodder yield from these lands is lower than the potential yield and the availability of good quality seeds are estimated to be around 15-25 percent only for cultivated forages (Chauhan et al, 2017). Availability of quality seed is vital because the forage crops have been bred for enhanced vegetative potential as they are shy seeders with very low seed productivity. Therefore, assured supply of fodder seed of improved varieties/hybrids to farmers at reasonable price is crucial for enhancing fodder production.

Stylosanthes is a legume fodder crop rich in crude protein that can be cultivated as grassland or pasture. Animals can feed on it directly. It is adapted to tropical climates and tolerant to low fertility, drought, acidic soils and poor drainage. The highly palatable *Stylosanthes hamata* species is preferred by animals. In India, Stylosanthes seed production started during the late 1970s by government departments. In the mid 1980s small farmers in the Rayalseema region, Ananthapur district in Andhra Pradesh, started Stylosanthes seed production to meet rising demand from government agencies for their wasteland development programs. Some farmers from the Palasamudram village in Ananthapur were trained in Stylosanthes seed production at the Raddipalli state farm of the Department of Animal Husbandry and Veterinary Services (Rao 2004). Over the years the improved seed production technology spread to surrounding villages through farmer-to-farmer exchange of seeds and technical knowledge. Stylosanthes seed production today is largely concentrated in three mandals of Hindupur and Penukonda Division of Ananthapur district comprising a network of 40–50 villages (Biradar

et al, 2013). So, seed demand for this crop is met predominantly by farmers which is not so in other crops. Farmers as seed producers of Stylosanthes are concentrated in the Ananthapur district of Andhra Pradesh and over the years this crop emerged as an important crop of the region. These aspects which provide entirely different scenario as compared to other crops intrigued researchers to understand the current production and the trend of this economically important crop of this arid region.

Methodology

Ex-post facto research design was used. This design was considered as appropriate because the phenomenon of Stylosanthes seed production by farmers has already occurred. The Research study was conducted in Hindupur region of Anantapur district of Andhra Pradesh state, as Stylosanthes seed production is predominantly carried out in this region. Three blocks viz., Gorantla, Chilamathur and Somandepalli were selected based on earlier studies conducted by ICAR-IGFRI, Jhansi where Stylosanthes seed production is practiced predominantly. TFour villages having maximum area under Stylosanthes cultivation were selected from each block. In total, 12 villages were selected. They were Gollapalle, Palasamudram, Vadigepalli and Mallapalle from Gorantla block, Settipalli, Kodikonda, Morasalapalli and Reddicheruvapalli from Chilamathur block and Bramhasamadram, Edulabalapuram, Chalakur and Julukunta from Samandepalle block. From each village, ten respondents were selected randomly, constituting a total sample size of 120. A structured interview schedule was developed by consulting experts and referring to the relevant literature. Pretesting of the schedule was carried out in a non-sample area for its practicability and relevancy. The final schedule was prepared by making necessary corrections based on pre testing results. The primary data was collected from the farmers through personal interview method in an informal atmosphere. Data was analysed using a compound growth rate analysis method.

Results and Discussion

Percentage change in Stylosanthes area cultivated by the respondent from 2011-2020

The total area under Stylosanthes cultivation by the respondents was 58 acres in 2011 and increased to 377 acres in 2018 and remained same till 2020 (Fig 1). Average annual increase in area was 55 per cent while compound annual growth rate of area under Stylosanthes was 28.46 per cent. Stylosanthes is a very hardy crop. It is credited with very high drought tolerance and is almost free from pests and diseases. The study area is characterized by very scanty and low rainfall, consisting of an arid and treeless expanse with poor red soils. Anantapur district is the second driest district in the country, after Jaisalmer district in Rajasthan. The average annual rainfall here is just 520 mm, which is the lowest in Andhra Pradesh and the second lowest in India.. Rainfall distribution is erratic, uneven, and irregular throughout the year. The study area is deprived of both the monsoons and subjected to seasonal drought. Variations in climate, in terms of temperature and rainfall, have become more and more evident in the last decade. Challenging weather accompanied by changes in climate parameters might have led respondents to increase the area under Stylosanthes in rainfed lands.

However, there is a decline in the irrigated area under Stylosanthes. Stylosanthes cultivation in irrigated areas was just 20 acres in 2011 and reduced to 8 acres in 2020. The availability of groundwater enhances the opportunity to grow varied crops. Farmers might have cultivated commercial and more remunerative crops like groundnut, maize, etc to obtain more income under irrigation. In addition, the price of Stylosanthes seed depends on demand from government agencies and, thus is volatile. Farmers of irrigated areas might instead grow those crops which would fetch them more stable price. This might be the reason for the decline of irrigated area under Stylosanthes.

A similar study by Biradar et al (2003) reported that the first survey taken up in 2002-2003 showed increase in area and the second survey taken up in 2012 to document changes in area from 2002-2012 showed decline in the area asthe purchase of Stylosanthes seed for watershed programs in Karnataka and Andhra Pradesh was discontinued.

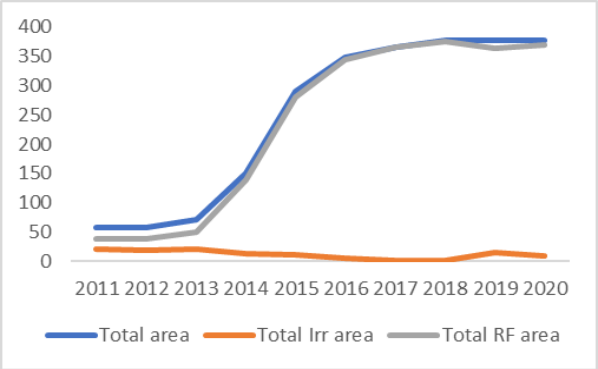

Figure 1 Average Irrigated and Rainfed area under Stylosanthes seed production 2011-2020

Percentage change in Stylosanthes seed production, yield and sale price from 2011 to 2020

Stylosanthes seed produced in 2011 was 36.25 metric tons which increased to 266.162 metric tons in 2020. However, seed production was greatest in 2017 (273.768 t) and in 2019 (274.079 t). There was a more than sixfold increase in area under Stylosanthes in the study area from 2011 to 2020. Correspondingly seed produced showed more than 7-fold increase. The increase in seed production was thus attributed to an increase in rainfed areas under Stylosanthes. There was a slight increase in seed yield (productivity) in different years with a minimum of 0.625 t/acre in 2011 to 0.727 t/acre in 2019. This minimal difference in seed yield might be due to favorable weather during flowering and seed set stage. Seed selling price in 2011 was USD 136.40/t. It increased to USD 308.40/t in 2018. The seed selling price, however, decreased in 2019 and 2020. Stylosanthes seed is traded by the respondents mainly through informal marketing channels. Middlemen who are in contact with different user agencies, mainly of public sector, get the orders. The price rise is directly related to the quantum of orders received by the middlemen. An increase in selling price thus might be attributed to the rise in demand for the seed. However, the selling price decreased in 2019 and 2020 due to a decrease in government orders for seeds as the increase in government expenditure to address the pandemic situation reducing allocation for agriculture and watershed projects. The average annual growth rate for seed production was 63.42 per cent, for seed yield 1.30 per cent and for selling price it was 1.16 per cent. Corresponding values for compound annual growth rates were 29.86 per cent (seed production), 1.09 per cent (seed yield) and 4.48 per cent (selling price). These findings indicate that changes in selling price was minimum in 10 years period while production showed good growth.

Decomposition analysis of Production Variability in Stylosanthes

Instability analysis on the area, production and productivity of Stylosanthes for a period of 10 years was carried out using Coppock's Instability Index (PII) as a measure for instability in Stylosanthes production. The results of the analysis indicated that about 52.90% of the total area was instable in the study area. Among the Stylosanthes, irrigated area was observed to be more instable compared to rainfed area. Production instability was observed to be 53.76 per cent. Seed yield and selling price were instable to the extent of 37.56 per cent and 55.1per cent. These findings confirm that the increase in Stylosanthes seed production was mainly because of an increase in area under Stylosanthes cultivation but not due to increase in yield level of the Stylosanthes.

Conclusion and Implications

The study highlights the significant growth in Stylosanthes seed production in Ananthapur district, driven by increased rainfed area cultivation due to its drought tolerance. However, irrigated areas declined due to preference for more lucrative crops. Market volatility and government demand fluctuations affect seed prices. Policy support and technological improvements are crucial for stable and enhanced production.

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