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Current status of *Stylosanthes* seed production in southern India

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Abstract

India is a significant producer of seed of *Stylosanthes* spp. (stylo), mainly *S. hamata*. Most of this seed is produced by villagers and small farmers in the Anantapur district, Andhra Pradesh, southern India. This is one of the poorest regions in the State, with harsh climatic conditions, poor, zinc-deficient soils, and, in the stylo seed production area, farm sizes averaging less than 2 ha. An informal network of seed traders markets the stylo seed within a 25−30 km radius and, via the next level of traders, to other parts of India. A survey in this area in 2002/03 indicated that stylo seed production in 2001 was about 800 t from more than 400 ha. A second survey, conducted in 2012, showed that the stylo seed production area had declined to 150 ha, with annual seed production of about 300 t. Most of the decline had occurred since 2007, when the purchase of seed for watershed rehabilitation in the States of Karnataka and Andhra Pradesh was discontinued. In addition to the loss of this major market, other factors influencing the reduction in stylo seed production included: the low price of stylo seed compared with groundnut (the crop mainly competing for land use); sales of land for other purposes, and diversion of one area as a Special Economic Zone; reduced availability and increased costs of labor, particularly after the establishment in 2005 of the National Rural Employment Guarantee Agency, which provided an attractive employment option for rural workers; lack of technical support; and, in one village, delay in payment. Poor seed quality was another issue constraining prices. Despite these challenges, many farmers in the region remain positive and would continue to produce stylo seed, if profitability could be improved.

Resumen

India es un importante productor de semilla de stylo (*Stylosanthes* spp.), principalmente *S. hamata*. La mayor parte de esta semilla es producida por aldeanos y campesinos en el distrito de Anantapur, Andhra Pradesh, en el sur de India. Ésta es una de las regiones más pobres del estado, con condiciones climáticas adversas, suelos pobres y deficientes en zinc. En las áreas productoras de semilla de stylo, las fincas miden en promedio menos de 2 ha. Una red informal de comerciantes vende la semilla dentro de un radio de 25−30 km y, por medio del siguiente nivel de comerciantes, a otras partes de India. Una encuesta realizada en 2002/03 indica que en 2001 se produjeron en esta área alrededor de 800 t de semilla de stylo en más de 400 ha. Una segunda encuesta, realizada en 2012, mostró que el área de producción había disminuido a 150 ha, con una producción anual de semilla de aproximadamente 300 t. La mayor disminución ocurrió a partir de 2007, cuando se suspendió la compra de semilla para la rehabilitación de cuencas de ríos en los estados Kamataka y Andhra Pradesh. Adicional a la pérdida de este mercado mayor, otros factores que influyeron en esta reducción fueron: el bajo precio de la semilla comparado con el de maní (cacahuete), el cultivo de mayor competitividad por el uso de la tierra; la venta de tierra para otros propósitos, incluyendo la declaración de una área como Zona Económica Especial; la reducción de la disponibilidad de la mano de obra y el incremento de su costo, particularmente después de que en 2005 se estableciera la National Rural Employment Guarantee Agency, la cual otorgó una opción atractiva de empleo para trabajadores rurales; la falta de apoyo técnico; y, en una aldea, el retraso en el pago por la venta de semilla. La baja calidad de la semilla también afectó los precios. A pesar de estos retos, muchos campesinos en la región mantienen una actitud positiva y continuarían produciendo semilla de stylo si la rentabilidad pudiera ser mejorada.

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Introduction

Land degradation and associated poverty are major challenges in rural areas of India with wastelands amounting to 114 Mha or almost 36% of the land area (ICAR 2010). Various policies and programs have been devised, mainly through 5-year plans, to address the issue. The significant boost for wastelands through watershed programs was given in the IX Plan (1997/98−2001/02). Watershed development, as a poverty-alleviation measure, has been given a high priority in India, as is evident in the 20-year Perspective Plan (2002/03−2021/22) for treating around 88.5 Mha in the next 20 years with a total investment of Rs 727.5 billion.

India has 15% of the global livestock population but only 2% of the land area. Restoration of degraded lands is also aimed to meet grazing requirements of livestock and wildlife in some areas (Ramesh et al. 2007). *Stylosanthes* spp. (stylo), pioneering colonizers, establish well on poor and severely eroded soils in dryland conditions. Their ability to improve soil bulk density, infiltration rate and water holding capacity makes them useful species for the conservation, stabilization and sustainable development of land and water resources (de Leeuw et al. 1994). There is a large demand in India for stylo seed, particularly *S. hamata*, a short-lived perennial legume which has perceived perenniality in this part due to self-seeding. Only a small portion of this demand is met by public sector-operated centers for forage crops; most demand is met by farmers of Anantapur district (13°−14° S, 76°−77° E) in southern India, who sow a *S. hamata* crop once in 3−4 years and produce seed.

Initially, in the mid-1970s, production of stylo seed by farmers in this region was aided by international pilot seed programs, in which seeds were produced by small and marginal farmers of this district. Some of these farmers later converted into producers-cum-traders. Eventually an informal network of seed producers and traders emerged and grew in scale and extent. Stylo seeds produced in this region today reach even the remotest parts of the country. A survey in this area in 2002/03 indicated that stylo (*S. hamata*) seed production (SSP) in 2001 was about 800 t from more than 400 ha (Rao et al. 2004). A similar survey was taken in 2012 to quantify current seed production and to examine the factors underlying the continuity (or otherwise) of production of stylo seed by the farmers of the area.

Methods

Anantapur is one of the most economically backward districts of Andhra Pradesh province of India (Figure 1). The average annual rainfall of the district is only 550 mm and, on average, 1 year in 3 years is a drought year. This district is divided into 3 revenue divisions, and most of the stylo seed is produced in the Penukonda division within the Gorantla, Somandapalli and Chilmathur revenue blocks, where stylo is cultivated extensively. The survey was undertaken in these revenue blocks. A preliminary list of villages, where stylo seed is being produced at present, was prepared by consulting with field staff of the AHVS Department and, as in the previous (2002/03) survey, many such villages were in the Gorantla block with a few in the Somandapalli and Chilamathur blocks. Our primary surveys therefore covered the Gorantla block extensively, and a few villages in the other 2 blocks. In total, the study covered 17 villages of which 10 villages were common to the 2002/03 and 2012 surveys.

The stylo seed crop is ready for harvest in January, when farmers are relatively free from other *rabi*-season farm operations. Therefore in January 2012, we carried out primary surveys, interviews and consultations with a cross-section of people, and detailed discussions with key informants and seed traders at 2 levels (village and revenue block). Separate checklists for seed growers and traders were prepared to guide the discussions in the field. Village surveys, however, formed an important part of the study to understand what was happening at farmer and village levels.

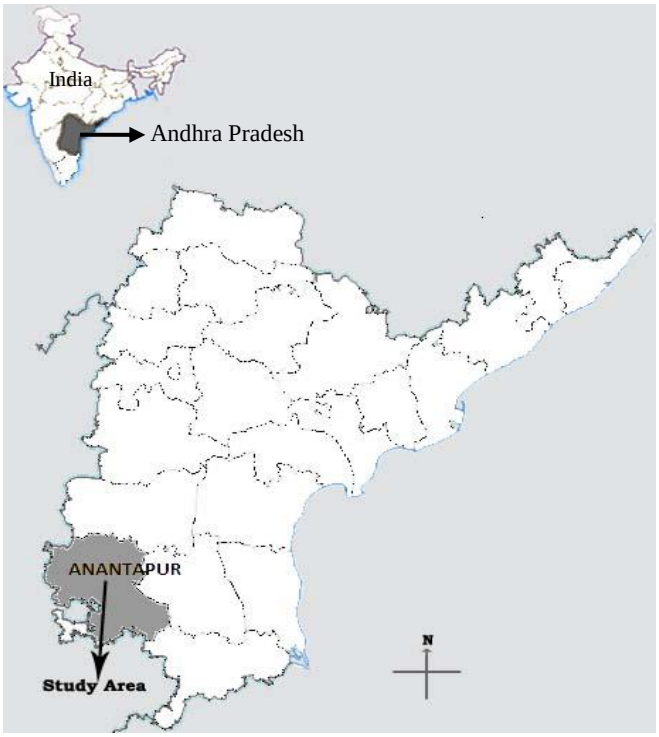

Figure 1. Map showing the study area.

Results

Estimated area under stylo seed crop in surveyed villages and reasons for decrease in the area

In almost all villages, the area under stylo had declined since the previous survey (Figure 2). The area had declined drastically in some villages, where only a few larger farmers, who were growers as well as seed traders, had continued to cultivate the crop. Farmers indicated that the steep fall in the area under stylo had occurred only after 2007, when demand for seed had decreased. This information from farmers was consistent with the banning of purchase of stylo seeds by Karnataka and Andhra Pradesh State Governments at that time, due to extreme adulteration and impurity of seeds sold by last-level middlemen. Except in a few villages, the majority of the small and marginal farmers had replaced the crop with groundnut, the traditional oilseed crop in this area. The landholdings of farmers in this dry tract are very small, and complete replacement of the stylo crop was observed in many cases. As prices of agricultural commodities including groundnut in India had increased, especially in this decade, SSP farmers reverted back to groundnut cultivation.

Palasamudram, the village with the greatest area under stylo (160 ha) in 2002/2003, had only10 ha under SSP in 2012, and this area belonged to larger farmers who were also traders of the stylo seed. Small and marginal farmers had discontinued stylo cultivation. The Government of Andhra Pradesh has earmarked 392 ha of land for a Special Economic Zone in this village, and 153.75 ha or 39% was owned by farmers who had previously cultivated stylo. This was a pioneering village for SSP, and some farmers from this village had been trained in SSP at government farms (Rao et al. 2004). Edula Ballapuram is another village where the area under stylo had been reduced remarkably, from 44 ha to 10 ha. The prime reason, expressed by the farmers of this village for discontinuing SSP, was undue delay in receipt of payment. This reason was specific to this village; in other villages payment was not a problem. The village seed trader, when consulted, however, mentioned that the problem of non-availability of labor had affected the crop. This trader had a stylo seed stock of 150 kg. Interestingly, in Guttivarapalli village there was no stylo cultivation in 2010, whereas some families resumed the cultivation of stylo in 2011 on a total area of 3.24 ha.

Some farmers said that they might resume cultivation of stylo, if prices for seed increased and if it proved more profitable than regular field crops. Cost of labor had increased 3-fold since 2002 but the price of stylo seed had remained constant. Non-availability of labor was another reason mentioned, as labor requirements for harvesting and further processing of seed are high. These operations must be carried out in the months of January

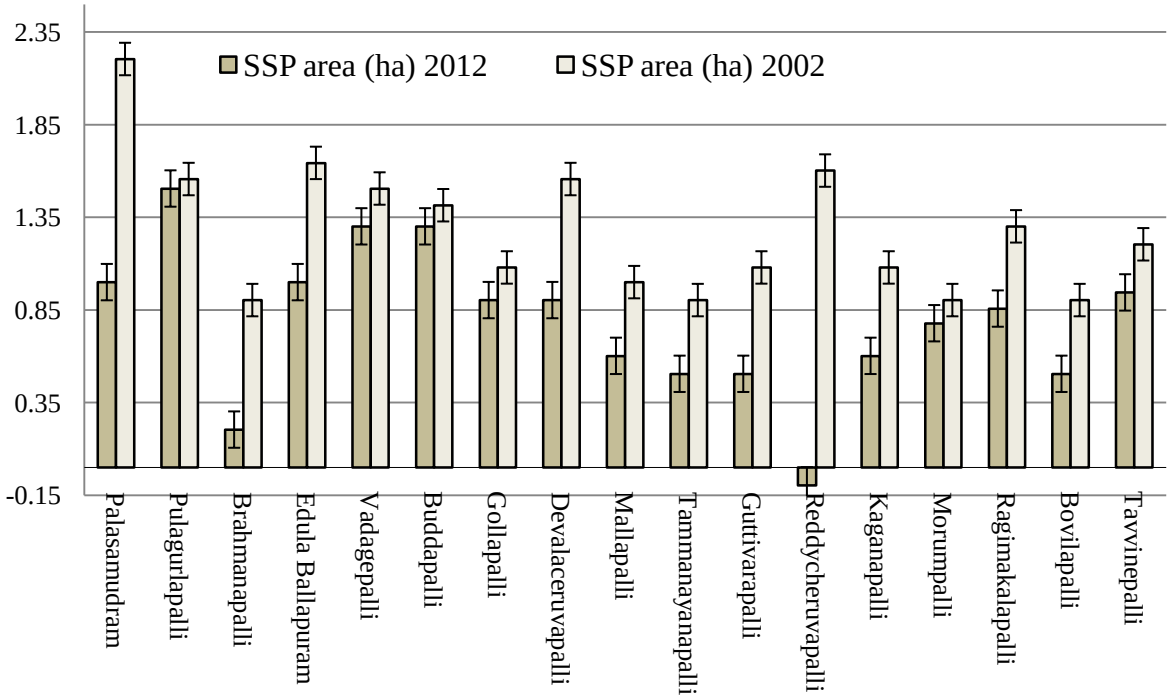

Figure 2. Area under SSP in surveyed villages (figure based on log transformed data to the base 10 with s.e. bars).

to March, when temperatures are high. Many laborers are reluctant to work under hot conditions, and would prefer to work elsewhere, especially as work opportunities have increased in the last 10 years. Many of the villages (Pulagurlapalli, Brahmanapalli, Reddy-Cheruvapalli etc.) are located adjacent to the Bangalore −Hyderabad national highway (NH-7). The completion of the Bangalore international airport at Devanahalli, less than 70 km away, had inflated land prices and many small and marginal farmers sold their land. Increased land prices and sale of land to private buyers or the government applied also to some of the stylo-growing villages located in the interior. In some of the interior villages, e.g. Ragimakalapalli, private seed companies had purchased large areas to establish seed-production centers and market the seeds from Bangalore to other parts of the country.

Cost of cultivation of stylo crop

Cost-benefit analysis (Table 1) of stylo seed production indicated that input costs had increased substantially in the last 10 years. The major component was cost of labor, which had almost tripled during the decade. There were many reasons for increased wages, the most important being the implementation of a National Rural Employment Guarantee scheme in 2005. Seed yield, fodder yield and the selling price of the seed did not show similar increases, but instead remained almost constant for a decade. As a result, the returns from the cultivation of stylo were reduced drastically; the B:C ratio decreased from 2.90 to 1.48, making it less remunerative for the farmers.

Seed demand, price and purity

There is an informal market for stylo seed, largely operated by the vast network of middlemen. No specific method exists for fixing the price or checking seed quality. The demand for stylo seed varies both from year to year and within a year. Lack of information on seed demand at the level of the village seed traders weakens their bargaining power on price, except to agree to the price offered. This results in the selling of spurious seeds by farmers and traders. Seed lots collected from various sources and places in the surveyed villages clearly indicated large scale admixtures, and average purity was only 28%. Truthfully-labelled stylo seed samples from public research farms have recorded 81% pure seed content. There is no specific method in place to assess seed demand, to fix the price or to check seed quality, thus favoring only the few big traders in the business. Rao et al. (2004) reported non-availability of data on the actual quantities of stylo seed purchased by various users.

Conclusion

The area under stylo in the region has declined considerably. Important reasons include non-availability of labor, increased wage rates and an almost constant price for stylo seed during the last decade. Mechanization of seed harvesting and processing in the area would reduce the dependence on labor. A system involving trusted agencies in the area is required to assess seed demand and to check the quality of seed in order to get a fair price. A reduction in labor usage combined with a fair price for seed could revive the ailing stylo seed production industry in the area, bringing greater stability to the livelihood of small and marginal farmers in this semi-arid area.

Table 1. Cost-benefit analysis of stylo seed production.

Factor	2012 (Rs/ha)	2002 (Rs/ha)
Input variable costs		
Seed[1]	0	0
Human labor	15 000	6000
Bullock labor/Machine labor	3250	1250
Farm yard manure	3000	1500
Inorganic fertilizer	2315	1437.5
Interest on working expense	942.5	407.5
Fixed costs		
Land rent[2]	7500	3750
Land revenue	0	0
Total costs	32 007.5	14 345
Output		
Seed yield (kg/ha)[3]	2000	2000
Price of seed (Rs/kg)[4]	18	18
Fodder yield (kg DM/ha)	2250	2250
Price of fodder (Rs/kg)	5	2.5
Gross returns	47 250	41 625
Net returns	15 242.5	27 280
Input:output ratio	1.48	2.90

[1]Fallen seeds germinate and give good crop stands, so cost of seed is considered zero.
[2]Cost imputed for owned land rent Rs 7500/ha. The Government of Andhra Pradesh does not levy any land revenue.
[3]Minimum seed yield, according to farmers; maximum about 4 000 kg; however, seed lot had high level of inert material (>50%).
[4]Relative price received by farmers over last 4 years.

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