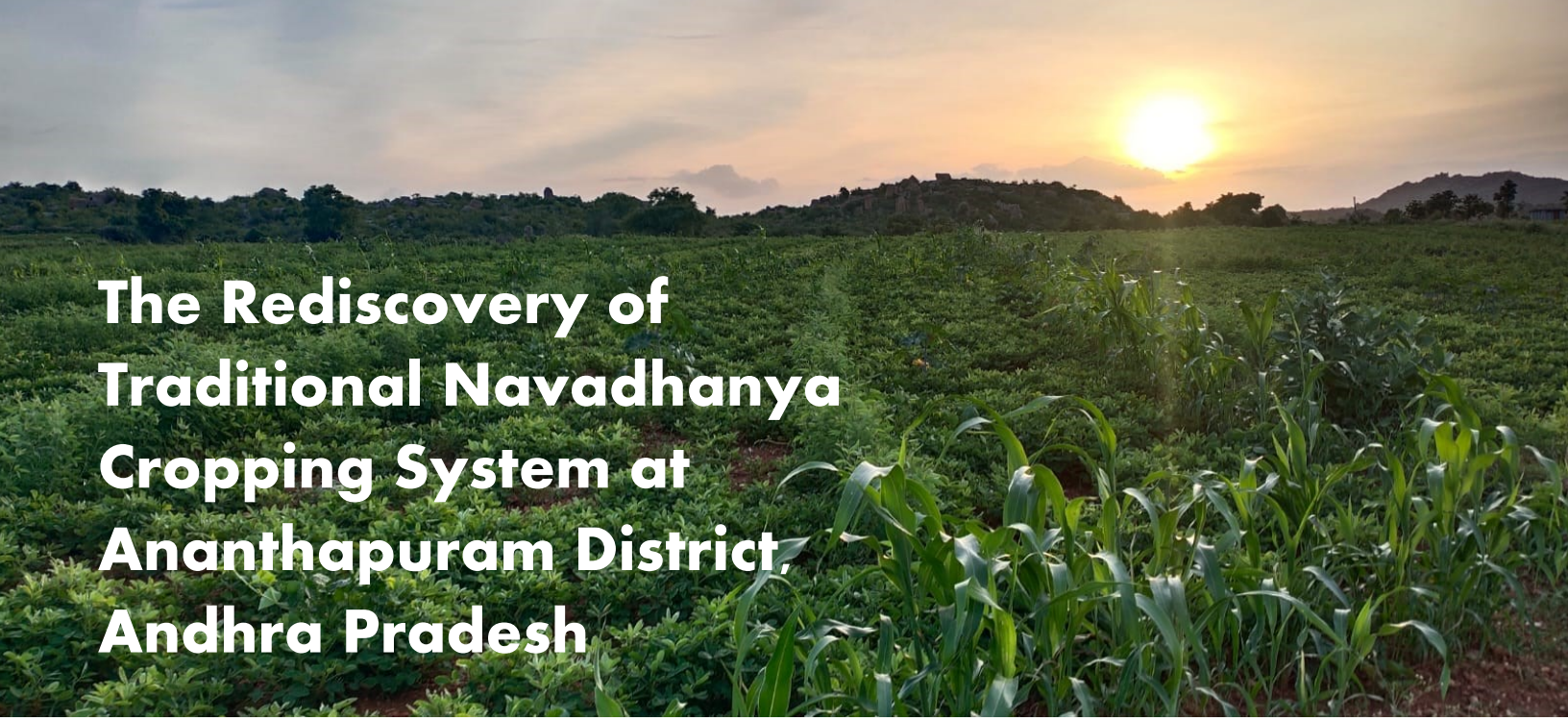

The Rediscovery of Traditional Navadhanya Cropping System at Ananthapuram District, Andhra Pradesh

Photo | Mr. Sandeep, WASSAN

Suryamoni Bhagyalakshmi •, Uthappa Gollapalli, Sudhakar U., and Uday K. Nagubandi

•*WASSAN, Hyderabad, Telangana. Email of the corresponding author: bhagya@wassan.org*

1. Introduction

Traditionally, mixed/poly-cropping systems were prevalent across the Indian sub-continent in general (IAASTD, 2009; La Via Campesina, 2010; Deb, 2021). Such cropping systems are known locally with different local names. For instance, in the districts of Ananthapuram and Chittoor of the Indian state of Andhra Pradesh (AP), they are referred to as *Akkidi pantalu* (meaning: sowing of a crop between the rows of another (or) a crop sown between the rows of another) in Ananthapuram and *Sala ginjalu* (Saalu is the space between two rows and ginjalu is grains in Telugu, the regional language) and *Kaayadanyam* in Chittoor district of AP. Traditionally, production of food grains dominated the farming system of both Ananthapuram and Chittoor districts of AP. Earlier, minor millets such as foxtail (*Setaria italic*), kodo (*Paspalum scrobiculatum),* and finger millet (*Eleusine coracana*), and major millet such as sorghum (*Sorghum bicolor*), different types of pulses and paddy are the major food grains of both the districts (Rukmani and Manjula, 2009; IOPEPC, 2017).

The current crop systems however, are tending steeply towards mono-crops (IOPEPC, 2017). Until 1970s, over two thirds of the total cultivated area, especially of Ananthapuram district was covered under food grains, of millets, paddy and pulses and the remaining area was under the production of peanuts and cotton (Malapala, 2016; Kumar and Subramanyachary, 2015; Malapala, 2000). This trend however, has changed since the late 1980s and by the year 2006, over 75 percent of the total cultivation area of the district was brought under the cultivation of peanuts (Rukmani and Manjula, 2009; IOPEPC, 2017). The shift from a mixed/poly-cropping system into a mono-cropping system may have had many implications to farmers, especially the small-marginal rainfed farmers of this region (Naidu, *et al* 2019). Studies suggest that peanut farmers, especially the small-size farmers cultivating peanuts as irrigated-mono-crop are susceptible to incurring more losses due to relatively low returns and high crop failure risk from erratic rainfall and volatile market prices (Kumar and Subramanyachary, 2019; Naidu, *et al* 2019). In this background, the Watershed Support Services and Activities (WASSAN), a non-profit based out of Hyderabad, embarked on a quest to discover traditional cropping systems which are locally adapted, resilient, and appropriate to the local socio-economic, climatic, and food cultures.

2. A quest and the rediscovery of a locally adapted traditional cropping system

Literature review was conducted for the identification of locally adapted traditional cropping systems. Following the literature review, a series of consultations and personal interviews were conducted with elderly farmers for documentation of locally adapted traditional systems. It was observed that traditional knowledge of poly-crop system like Navadhanya is wide spread among the famers of Ananthapuram district of AP. It was learned that traditional poly-crop systems like Navadhanya keeps the soil covered for the most part of the year, till February-March and soil is

exposed only during April-May, which is the period of land preparation. Unlike Navadhanya, mono-crop system like mono-crop of peanuts leaves the soil exposed to the elements of nature for prolonged period – i.e. soil remains exposed from November – June, after harvest of groundnut around November. The prolonged exposure of soil not only leads to erosion of top by wind and water but also loss of soil moisture.

Poly-crop system like Navadhanya contributes to accumulation of huge volumes of biomass, through addition of crop residue to the soil. Traditional poly-crop system not only harvests rainfall very effectively but also sustains the crops during monsoon failures, therefore, highly Climate Resilient and minimizes the risk. While groundnut is harvested early, Navadhanya crop system makes use of the rains from N-E monsoon and later on, the winter dew to sustain the crops; thus making the system most effective in exploiting the local rainfall pattern.

In addition to the 'main crop' (peanut in the project area), which is aimed at commercial markets, poly-crop system provides several varieties of pulses, oil seeds, vegetables and cereals/millets for domestic consumption. The system requires no external inputs and over time the quality of land improves substantially. The system is less labour intensive and a family can conveniently manage the farm of 2 acres. Navadhanya crop system involves one time sowing after land preparation, single weeding and regular harvests. Only issue is the time spent for regular harvests of relatively small quantities, processing and storage.

3. Piloting the locally adapted traditional cropping system in partnership with the ZBNF farmers

The earlier works on Navadhanya crop system by Narayana Swamy Malapala[1], informed the design of the interventions and components of the current programme. His work has informed also designing of an action research study, which involves collection of primary information through personal interviews and consultations with elderly farmers and field observations with regards to crop composition, crop combination, and crop geometry of the Navadhanya crop system.

Based on the analysis of primary and secondary data, the geometry for Navadhanya cropping system was designed by WASSAN and promoted under the current zero budget natural farming (ZBNF) programme. Navadhanya crop system has specific design principles and crop geometry (including rows, intra rows, vertical canopy cover, and the time of crop maturity). Further, the sowing time for Navadhanya crop system is usually June – July. If the onset of monsoons fail, i.e. sowing gets extended to July then only plant 1st Akkidi (do away with 2nd Akkidi crops). The crop geometry, crop combinations of Navadhanya crop system is delineated below in the *table (1)*.

Table 1. Geometry and Crop Combinations of the Navadhanya Crop System

S.No	Rows	Duration of Crops	Crop Combination
1	1st Akkidi	4 months	2 crops : Sajja (Bajra) + Alasanda in 7:1 ratio. i.e. 0.75 to 1 kg Sajja with 100 gm Alasanda.
2	2nd Akkidi	6 months +	2 kg Redgram + 100 gm alasanda + 100 gm greengram + ½ kg Castor 25 gm gongoora + 25 gm (choudekayalu) + 25 gm benda
3	Main Crops in between Akkidi (5 rows)	3 to 4 months	
	Types 1: Groundnut as main crop		60 kg groundnut/ ac (mix with local alasanda, green gram or seetamma jonna or castor)
	Type 2: Korra / Saama + Sesame	3 to 5 months	3 to 4 kg kora + 50 gm nuvvulu (sesame)
	Type 3: Sorghum / Bajra	These were not discussed in detail	
	Others: Sun flower / Maize		
4	Border rows (Kanche panta)		Sorghum / Sajja or bajra in 4 rows (can be accommodated within the above seeds)

Navadhanya cropping system was piloted in Ananthapuram and Chittoor districts of Andhra Pradesh during 2016. It was promoted along with the groundnut seed distribution. In the same year, the programme was launched only at Ananthapuram district. The target was to encourage 25000 farmers to adopt Navadhanya cropping system, covering 5000 acres, during 2016. About 23624 farmers of Ananthapuram who bought groundnut seeds from the mana vittana Kendra (MVK) / department have adopted this system covering 47248 acres (*percapita area of 2 acres*) in the district.

[1] *Malapala N.S, 2016. Navadhanya – A System of Farming Practices in Rainfed Areas of Ananthapuram district of Andhra Pradesh. HANDS – Gooty, Ananthapuramu, Andhra Pradesh.*

The following year 2017, Navadhanya had been extended to Chittoor along with Ananthapuram district. The target for the year 2017 was to encourage 50000 farmers, covering 100000 acres and 6500 farmers, covering 6500 acres of Ananthapuram and Chittoor districts respectively. A total of 33550 farmers, covering 84545 acres (*percapita area of 2.5 acres*) and 4445 farmers, covering 5500 acres (*percapita area of 0.84 acre*) adopted Navadhanya cropping system in Ananthapuram and Chittoor districts respectively.

For the year 2018, the target was to encourage 50000 farmers, covering 100000 acres and 10000 farmers, covering 10000 acres of Ananthapuram and Chittoor districts respectively. A total of 25252 farmers, covering 50503 acres (*percapita area of 2 acres*) and 6482 farmers, covering 6700 acres (*percapita area of 0.67 acre*) adopted Navadhanya cropping system in Ananthapuram and Chittoor districts respectively.

In the year 2019, the target was to encourage 500 farmers, covering 500 acres and 750 farmers, covering 750 acres of Ananthapuram and Chittoor districts respectively. However, a total of 1200 farmers, covering 1200 acres (*percapita area of an acre*) and 450 farmers, covering 726 acres (*percapita area of an acre*) adopted Navadhanya cropping system in Ananthapuram and Chittoor districts respectively. It is necessary to notice here that achievement in terms of number of farmers and acreage was double the amount of target at Ananthapuram. Although, the achievement is 60 percent in terms of number of farmers but the achievement is about 97 percent in terms of acreage at Chittoor. The details of programme targets and achievement in terms of number of farmers, Navadhanya seeds kits and acreage from 2016 – 19 is presented in the *table (2)* and figure *(1)*.

Figure 1. Performance of Targets (T) & Achievement (A) at Ananthapuram & Chittoor Districts for the Period 2016 - 19

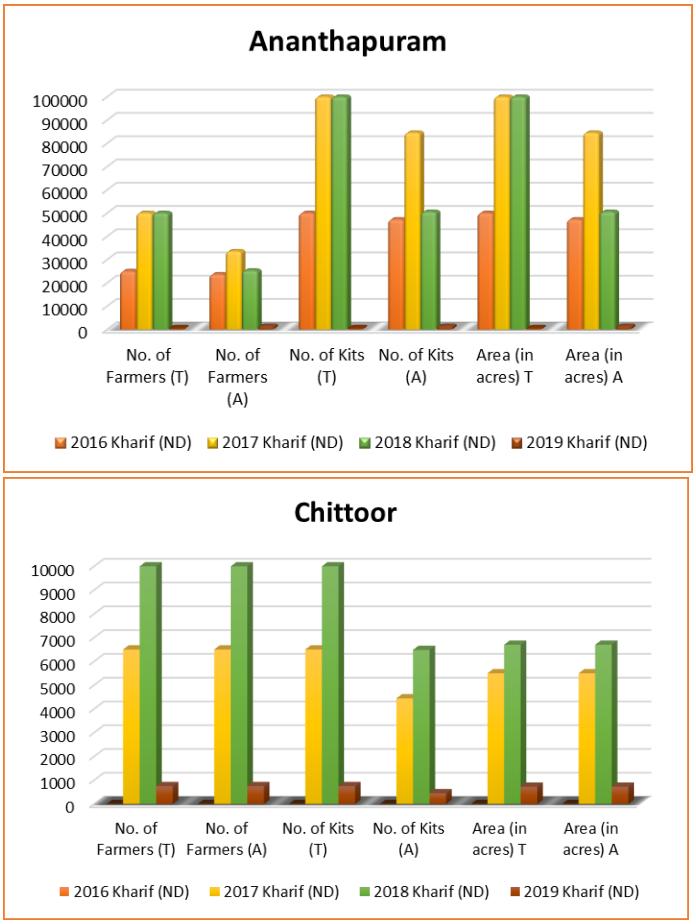

Table 2. Details of the Programme Targets & Achievement at Ananthapuram & Chittoor Districts for the period of 2016 - 19

Crop Season & Year (Ananthapuram)	Target			Achievement		
	No. of Farmers	No. of Kits	Area (in acres)	No. of Farmers	No. of Kits	Area (in acres)
Kharif (ND) 2016	25000	50000	50000	23624	47248	47248
Kharif (ND) 2017	50000	100000	100000	33550	84545	84545
Kharif (ND) 2018	50000	100000	100000	25252	50503	50503
Kharif (ND) 2019	500	500	500	1200	1200	1200
TOTAL	**125500**	**250500**	**250500**	**83626**	**183496**	**183496**

Crop Season & Year (Chittoor)	Target			Achievement		
	No. of Farmers	No. of Kits	Area (in acres)	No. of Farmers	No. of Kits	Area (in acres)
Kharif (ND) 2016	0	0	0	0	0	0
Kharif (ND) 2017	6500	6500	6500	4445	5500	5500
Kharif (ND) 2018	10000	10000	10000	6482	6700	6700
Kharif (ND) 2019	750	750	750	450	726	726
TOTAL	17250	17250	17250	11377	12926	12926

4. Deriving strategies for scaling-up of the Navadhanya Cropping System

Implementation of the Navadhanya programme has led to many interesting observations and lessons. Observations span across the community, project, policy and human-environment system levels. Lessons and observations of the programme have been listed as below:

4.1. Community Level

- Challenges in sowing as the sowing devices mounted on the tractor for sowing is not configured for sowing multiple seeds of poly-crops like Navadhanya.
- Although elderly farmers still retain the knowledge of poly-crop systems but the same cannot be said about the young farmers. There is a lack of knowledge of poly-crop systems like Navadhanya among the young generation.
- In general, famers interested in practicing Navadhanya crop system have been facing challenges due to unavailability of indigenous heirloom seeds locally.
- Seed producing farmers interested in the supply of seeds for Navadhanya have been facing challenges from the lack of appropriate machinery for processing of the seeds.

4.2. Project Level

- It is difficult to place the indent for seeds requirement from the lack of recurring purchase of seeds by farmers practicing Navadhanya crop system. Either the lack of fluctuation in the demand could lead to incurring unexpected financial losses.
- Organizing the entire seed supply chain in terms of mapping of indigenous seeds, multiplication, processing and distribution through MVKs has turned out to be cumbersome.
- There had been challenges in development of low cost seed storage technologies to enhance longevity of seed storage and contain pest infestations

4.3. Policy Level

- There is a conflict between Mana Vittana Kentra (Farmer seed councils) and Seed Corporations with regards to preference of indigenous and improved seed varieties.
- Mana Vittana Kentras (MVKs) need a little financial support from the government to establish infrastructure and revolving fund.

4.4. Human-Environment System Level

- There is a need for collection rainfall data to correlate the performance of Navadhanya crop system with the local rainfall pattern.
- The lack of rainfall leads to clearing of the farm land using the tractor thereby leading to the loss of the entire crop.
- Navadhanya crop system was found to be suitable at places under the influence of the North-East and South-West monsoons.

5. References

Deb, D. 2021. Productive efficiency of traditional multiple cropping systems compared to monocultures of seven crop species: a benchmark study. Experimental Results, 2, e18, 1–10. https://doi.org/10.1017/exp.2021.7

IAASTD (International Assessment of Agricultural Knowledge, Science and Technology for Development) (2009) Agriculture at a cross- roads: global report. B.D. MacIntyre, H.R. Herren, J. Wakhungu, R.T. Watson, eds. Washington, DC, Island Press

IOPEPC, 2017. *Survey of Groundnut Crop, Kharif-2017*. Indian Oilseeds and Produce Export Promotion Council, Mumbai.

Kumar S.R., and Subramanyachary P. 2015. Major agricultural crops in Chittoor district. *PARIPEX – Indian Journal of Research*. 4(5).

La Via Campesina (LVC). 2010. Sustainable Peasant and Family Farm Agriculture Can Feed the World. Via Campesina Views no. 6, 15 pp. URL: http://viacampesina.org/downloads/pdf/en/paper6-EN-FINAL.pdf

Malapala N.S., 2000, *Navadhanya Cropping System*. HANDS NGO, Permanent Green and WASSAN. Manchi Pustakam, Secunderabad. ISBN No. 978-93-93-83936-42-7

Malapala, N.S. 2016. Navadhanya – A System of Farming Practices in Rainfed Areas of Ananthapuram district of Andhra Pradesh. HANDS – Gooty, Ananthapuramu, Andhra Pradesh.

Naidu, C.B., Kumar S., and Rai A.K. 2019. An economic analysis of production of groundnut (*Arachis hypogea*) in Ananthapur district of Andhra Pradesh. *International Journal of Innovative Science and Research Technology. Vol. 4(5)*. ISSN No:-2456-2165

Rukmani, R., and M. Manula, 2009. *Designing Rural Technology, Delivery Systems for Mitigating Agricultural Distress: A Study of Ananthapuram District*. M.S. Swaminathan Foundation, Chennai. India.