The improved variety Roma spread over an area of 1,300 ha replacing the traditional cultivars and the net returns increased almost threefold - Rs. 4,20,000/- for improved varieties and Rs. 1,65,000/- for local cultivars.

The introduction of simple and easily operated farm machinery for turmeric boiling and polishing helped to improve the standards of on farm primary processing operations. The establishment of four pilot units for turmeric processing gained wide acceptance among the target tribal communities. The polished turmeric sold in the local markets fetched the farmers a higher price of Rs. 3-5 /kg. The reported advantages were easiness of operation, reduced processing time and fuel use, enhancement in the quality of the produce to ensure food safety and nutritional security. Women self help groups supported by Giri Chaitanya Farming & Marketing Mutually Aided Cooperative Society launched four value added products two each in black pepper and turmeric which were marketed in niche markets. ICAR-IISR provided training, capacity building, quality testing, labeling and branding services to the women entrepreneurs.

An area of 1,483 ha. of turmeric involving 1,050 farmers organized under two FPO's was brought under organic cultivation adopting the technologies developed by ICAR-IISR. Out of these FPO's, Maathota FPO, was provided with organic certification by TQ Cert Services Private Limited. This FPO is selling organic products for premium price to spice industries operating in Kerala.

The programme on black pepper was initiated by the establishment of a master black pepper nursery at the farm owned by ITDA in Chintapalle with six thousand cuttings of eight improved varieties of black pepper developed by ICAR-IISR. A total of 1,45,000 cuttings were distributed to the tribal farmers in Arakku valley during two seasons. The ITDA initiated and area expansion programme which resulted in an estimated increase of 10,000 to 12,000 acres every year since 2015. The area under black pepper registered an increase from 56,378 acres in 2015 to 10,378 acres in 2019.

The significant innovative outcomes of the project can be summarized as introduction of improved varieties in turmeric – Roma and IISR-Pragathi, replacement of age old traditional practice of 2-3 seasons turmeric cultivation in the same land with one season cultivation and adoption of farm machinery for primary processing in turmeric. The area expansion in black pepper in traditional coffee based agro forestry system not only enhanced the income of farmers but also broadened the scope of carbon sequestration for ecological sustainability. Based on the findings of the project, the Integrated Tribal Development Agency (ITDA), Paderu has envisaged futuristic schemes for large scale supply of seeds/planting material of turmeric and black pepper. The agency also proposes to promote mechanization of primary processing and establishment of community secondary processing units.

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Value Chain Model for Spices Farming and Processing for Livelihood Improvement of Tribal Community in Vishakapatnam Andhra Pradesh

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Vishakhapatnam is identified by the NITI-AYOG as Aspirational Districts in the state of Andhra Pradesh. Vishakapatnam district has a sizable proportion of tribal population, about 14.5% of the total tribal population in the state. Out of three Divisions, Vishakapatnam, Narasipatnam and Paderu in the district, a major proportion of tribal communities (89.98%) are dwelling in Paderu Tribal Agency Area. There are 3,574 Tribal hamlets in Paderu, out of which 1,093 are identified as Primitive Tribal Groups (PTGs). Out of eight tribal groups in the state that are identified as PTGs which require special treatment, three communities are living only in the Paderu agency area. Agriculture followed by collection of non timber forest produce is the major occupation. The basic social indices like literacy, formal education and health are low for these tribal communities.

The net income of tribal farmers from agriculture is as low as less than Rs. 10,000/-. The farmers follow traditional and highly conservative agricultural practices bound by age old customs. Besides, access to knowledge and communication resources is also limited. The spice growing areas in the district are identified as habitats with higher biodiversity. Black pepper and turmeric are the two major spices cultivated in Vishakapatanam. Turmeric is the subsistence cash crop cultivated by all communities of tribal farmers. Black pepper was introduced in the later half of 1970's as an intercrop in the traditional coffee plantation in the hill zones of Paderu.

ICAR Indian Institute of Research has implemented a multi institutional project leveraging several technologies which are already available with the organization for immediate benefit to the tribal community at Paderu. The collaborative institutions were Integrated Tribal Development Agency (ITDA), Paderu; Society for Elimination of Rural Poverty (SERP), Vijayawada; Tata Trust, Vijayawada; and two NGO's in Vishakapatnam District. The first stage of the project initiated in 2011-12 was technology testing or research trials carried out by All India Coordinated Research Project on Spices (AICRPS) located at Horticultural Research Station , YSR Horticultural University, Chintapalle falling within the target area of the project. Comparative Varietal Yield Trials (CVYT) and Research Station trials of technologies were carried out and eight technologies defined as Good Agricultural Practices (GAP) suitable for this agro ecological zone were selected for upscaling. The selected technologies were improved varieties of turmeric and black pepper, raised bed system of land preparation for turmeric cultivation, organic and micro nutrient formulations developed by ICAR-IISR, intercropping in turmeric, promotion of bio intensive nurseries of black pepper, mechanization of primary processing in turmeric and production of value added products and branding for entrepreneurship development.

The twin strategies aimed at this location were "Area expansion in black pepper" and "Value adding turmeric". The interventions planned aimed at strengthening already existing network of Farmer Producer Organizations, through increasing spice crop productivity, increasing bio resource use efficiency and strengthening processing sector.

The specific objectives were:

- To increase productivity of selected spices by promoting adoption of standardized Good Agricultural Practices.
- To promote entrepreneurship by providing community assets for mechanization of post-harvest handling and production of value added products in spices.
- To develop skills among farmers for scientific cultivation, processing and value addition of produce to improve monetary benefits.
- To strengthen market linkages of Farmer Producer Organizations / Collectives through product branding and exploitation of niche markets.
- The work plan for the project followed a value chain, multi institutional and multi disciplinary approach, consisting of following research and technology dissemination activities.
- Comparative Varietal Yield Trials (CVYT) and Research Station trials of technologies
- Participatory Rural Appraisal for gathering bench mark information
- Establishing demonstration plots of Good Agriculture Practices
- Skill enhancement training to promote adoption of standardized Good Agriculture Practices (GAP) in spices cultivation
- Establishing state of the art spice primary processing units (Black pepper, Turmeric) that are commercially viable for small groups or existing FPOs.
- Quality testing and chemo profiling of spice produce and value added products for branding and commercialization.
- Organizing buyer seller meets and leveraging media for capturing niche markets.

The achievements and impact of the programme were tracked through following variables - technology diffusion and adoption by farmers, increase in productivity, increase in farm net income, qualitative indicators like improvement in the quality of produce and entrepreneurship development. The major impact was recorded due to two interventions namely- improved varieties of turmeric (Roma and IISR- Pragathi) and mechanization of primary processing in turmeric. A survey conducted during two seasons indicated that average yield for local cultivars were 3 MT of dry turmeric and 8 MT for Roma variety. The dry recovery of Roma was also higher (22-24 %) compared to local cultivars (15-16% dry).