



Women Empowerment in Tropical Tuber Crops: Challenges and Strategies



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Key message

Women are the ones whose presence brings prosperity in all and every field around the globe. A world can never survive in the absence of women be it in any sphere of activity. Woman stand alone in her perspective and has an ambition to learn, do and contribute.

- Indian agriculture stands a testimony for women's contribution either as a land owner, farm labourer or both.
- Women actively participate in crop cultivation, animal husbandry and fisheries.
- Even women earn a livelihood and food security through involving themselves in tuber crops cultivation mainly in India, Africa and other south east Asian countries.
- Tropical tuber crops like cassava, sweet potato, yams, aroids, Chinese potato and arrowroot occupy a prime position among the food crops in the world. They occupy third position of cultivated species, after cereals and pulses and occupy a remarkable position in the food security of the developing world. They are also used as animal feed or as raw material for several industries.
- They are the future crops because of their rich starch content and may become a suitable substitute for cereals. They are also known for their climate resilience nature and their capacity to fit in cropping systems.
- They also provide livelihood to rural women and women participate in cultivation on par with men.
- Still, decades after decades the contribution of women was not wholly recognised. They still remain as grey areas which need to be researched and discussed in forums to value their contributions.
- Empowering and mainstreaming rural women workforce in tropical tuber crops can bring paradigm shift towards economic growth and development.
- Women are capable to make better decisions, and have leadership and entrepreneurship skills to do their responsibilities in agriculture.
- To prove their efficiency and ability, required platforms

and avenues are not opened up. They are always considered second to men in the society.

- Being responsible for most of the chores they face many challenges which hinder their productivity and ability to participate in their work.
- The challenges are well documented by many researchers irrespective of crops which are mainly reported as limited access to education and resources, wage discrimination, lack of training, ownership of assets, technical support and market intelligence.
- These challenges are to be addressed effectively so as to improve their living and indirectly the agricultural development.

Preamble

The tropical tuber crops consist of cassava, sweet potato, yams, aroids (elephant foot yam, taro, tannia, giant taro, swamp taro), Chinese potato, yam bean, arrowroot and certain other crops. These crops are the third most important food crops after cereals and pulses and are either a staple or secondary staple for one in every five of the world population. Cassava and sweet potato rank among the top 10 food crops produced in developing countries that contribute about 6% of the world's dietary calories. They contribute to food and nutritional security, income generation, employment, source of feed and provide raw materials for many industrial products. Tropical tuber crops are the source of sustenance and livelihood security of about 200 million people across 21 different states of India viz., Kerala, Tamil Nadu, Andhra Pradesh, Karnataka, Odisha, West Bengal, Bihar, Uttar Pradesh, Chhattisgarh, Gujarat, Goa, Maharashtra, Jammu and Kashmir and north-eastern states.

Tropical tuber crops are cultivated in an area of about 0.391 million ha with a total production and productivity of about 9.82 million tons and 21.36 t/ha respectively. The most significant tropical tuber crops in India are cassava, sweet potato and elephant foot yam due to their extensive commercial cultivation, market demand and other diversified uses which contribute to 5.1% of total vegetable production whose present market value is ₹196 billion.

Area, production and productivity of important tuber crops in India

Crop	Area (million ha)	Production (million tons)	Productivity (t/ha)
Cassava	0.172	6.210	36.10
Sweet potato	0.107	1.180	11.03
Elephant foot yam	0.040	0.980	24.74
Yams	0.030	0.810	27.00
Taro	0.040	0.610	15.30
Chinese potato	0.002	0.028	14.00
Total	0.391	9.818	

India ranks second in global cassava productivity (36.10 t/ha) next only to Guyana (41.45 t/ha) in 2022 (FAO, 2022). Cassava is grown in an area of 0.172 million ha producing 6.21 million tons. Tamil Nadu, Kerala and Andhra Pradesh are the major cassava producing states in India. Whereas, sweet potato are cultivated in an area of 0.107 million ha producing 1.18 million tons (FAO, 2022) and mainly grown in Odisha, West Bengal, Uttar Pradesh, Madhya Pradesh and Karnataka. Elephant foot yam is cultivated in 0.040 million ha producing 0.980 million tons. West Bengal, Andhra Pradesh, Gujarat, Kerala and Tamil Nadu are the major elephant foot yam producing states in India (Indiastatagri, 2022). The other tuber crops such as yams, taro, tannia, Chinese potato and arrowroot are mainly grown in Kerala, Odisha, Uttar Pradesh, Madhya Pradesh, Andhra Pradesh, Chhattisgarh, Gujarat and Tamil Nadu in an area of more than 0.07 million ha. These crops are known for high biological efficiency (cassava: 250 kcal/ha/day; rice: 155 kcal/ha/day) and energy production efficiency (cassava: 1000 MJ/kg N; rice: 350 MJ/kg N), resilience to climate change, candidate crops for agroecology based sustainable production intensification that aims at greening the 'Green revolution' and multipurpose crops as food for food insecure & nature dependent people, animal feed & industrial raw materials.

In India, tuber crops are considered as an important source for food and nutritional security, income generation, employment, animal feed and raw materials for many industrial products. Tuber crops have also proved to be life sustaining crops in times of natural calamities and famine. It is also worthy to note that tropical tuber crops such as cassava and yams are able to cope with climate vagaries such as drought, high temperature and salinity which qualify them to be dubbed as 'future smart crops'.

Why empowering women to be focused?

India is an agrarian economy with about 45.80 percent of total workforce engaged in agricultural and allied sector activities (GoI, 2023). The Agriculture Census (2010-11) shows that out of an estimated 118.7 million cultivators, 30.3 per cent were females. Similarly, out of an estimated 144.3 million agricultural labourers, 42.6 per cent were females. According

to Census 2011, there has been a 24 per cent increase in the number of female agricultural labourers between 2001 and 2011 and out of the total female main workers, 55 per cent were agricultural labourers and 24 per cent were cultivators (GoI, 2011).

The data suggested that providing women with equal access to agricultural productive resources, such as land, livestock, use of inputs, information technology, agricultural machinery, irrigation and financial services, would increase the productivity of farms by 20–30% and would raise the agricultural output of developing countries by 2.5–4.0%, consequently reducing the number of hungry people in the world by 12–17%. In many countries, agri-food systems remain a major source of livelihood for women as compared to men. In spite of this, women's access to resources, input services, land and digital technology, remains poor as compared to men (FAO, 2023).

Feminisation is witnessed in most parts of the country due to the migration of men in search of better job opportunities, employment and better living standards which is also observed among tuber crops farmers. So, women need to play a multifaceted role as cultivators, labourers, entrepreneurs and family heads with greater responsibilities. The feminisation of agriculture places women at the forefront of the climate crisis; as this sector engages a majority of women, climatic variability would greatly impinge on their livelihoods and magnify issues of food insecurity, loss of income, security, and welfare (Singh, 2023).

Women are capable to make better decisions, and have leadership and entrepreneurship skills to do their responsibilities. To prove their efficiency and ability, required platforms and avenues are not opened up. Gender neutrality is a missing link in the society. Women's empowerment and its relationship with farm-level productivity, need to be studied in depth especially in developing countries where women constitute 43% of the agricultural labour force (FAO, 2011). The informal economy, also known as the grey economy, is not governed by labour laws, leaving many exposed to low pay and unsafe working conditions and without social benefits (UN report, 2016). Empowering and mainstreaming rural

women workforce in agriculture can bring paradigm shift towards economic growth and development. It will enhance food and nutrition security and alleviate poverty and hunger. It will be a win-win strategy for achieving Sustainable Development Goals by 2030.

Women in cultivation of tropical tuber crops

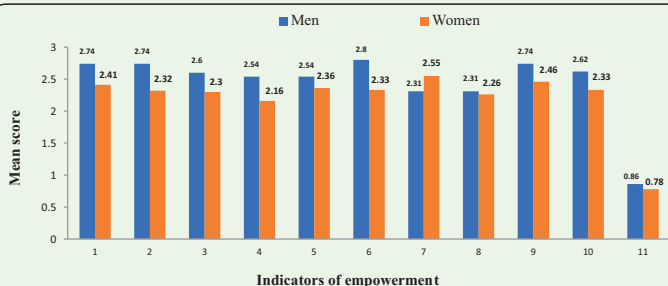
Women in cultivation of tropical tuber crops fall under the category of unorganised sector where they are devoid of several opportunities and facilities. Study was conducted in four states namely Tamil Nadu, Kerala, Karnataka and Odisha among cassava, sweet potato and Chinese potato farmers.

Women's empowerment was measured using ten key indicators: Input in productive decisions, autonomy in production, ownership of assets, purchase, sale or transfer of assets, access to and decisions on credit, control over use of income, group membership, speaking in public, workload and leisure time.

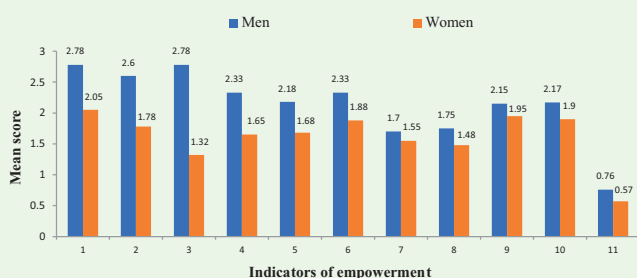


Empowerment level of women in tuber crops

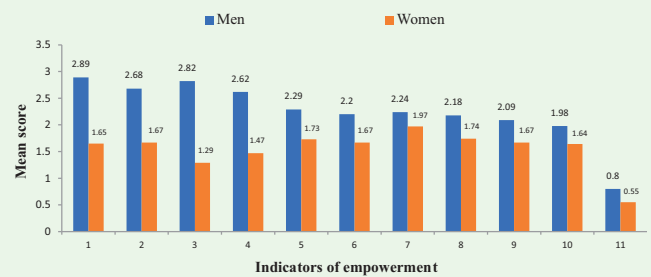
Empowerment level of women and men in cassava cultivation in Kerala



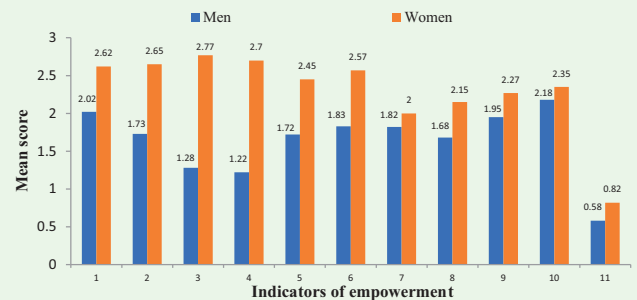
Empowerment level of men and women in sweet potato cultivation in Odisha



Empowerment level of men and women in sweet potato cultivation in Karnataka



Empowerment level of men and women in Chinese potato cultivation in Tamil Nadu



Indicators of empowerment

1. Input in productive decisions
2. Autonomy in production
3. Ownership of assets
4. Purchase, sale or transfer of assets
5. Access to and decisions on credit
6. Control over use of income
7. Group membership
8. Speaking in public
9. Workload
10. Leisure time
11. Empowerment index

Gender in decision making in tuber crops

Women empowerment infers giving an open hand to women in the decision-making process in various spheres of life, enabling them to manage risks and improve their well-being and status (Kurtiş et al., 2016 and Richardson, 2018). Involvement of gender in decision making in tuber crops are mostly dominated by men when compared to women and the decision making power is very low with the women involved in Chinese potato. Even though they are involved in cultivating these crops the productive decision are taken by men. Social norms existing in the society and the male dominance may have influence on the role of women to take decisions. Male continues to be the main earning member, with the major decision making role. The Indian society assumes male member as the head of the family. Male child preference dominates Indian households.

Why women need to be involved in decision making

- Women participation in decision making is not just a right, but also key to sustainable development.
- Participation irrespective of gender in decision-making broadens the perspectives, increases creativity and innovation, diversifies the pool of talents and competences, reduces conflicts and improves the process of decision-making.
- Decision making capacity and power is crucial to ascertain women's rights and to accomplish bigger growth objectives like economic development and social welfare.
- Financial independence and education empower women and help them to withstand against social evils like domestic violence more strongly, can protect their children, make better decisions for their future and can become support for their family and society.

Autonomy in production

Women farmers can pursue autonomy in their farming practices by making independent choices about agricultural production. In the broader context of gender equality, enhancing women's autonomy-broadly defined as a woman's ability to have control or influence over choices that affect herself and her family within her own particular context (Carlson *et al.*, 2015). They can have autonomy in adopting the agroecological practices, choosing the type of crops to be grown, using organic inputs, selection and multiplication of planting materials on their own, maintaining soil fertility at low cost, safeguarding the nutrition of their family with the crops they grow, marketing of the products etc. Autonomy in production of the crop is lower than men in the case of sweet potato and Chinese potato as compared to cassava.

Autonomy in production by women leads to increased efficiency

- Ability to ensure a nutritionally adequate diet for their households.
- Reduction in cost of cultivation.
- Organic cultivation as women care more about the health of the family.
- Women can remain independent as entrepreneurs.
- Can have market control over the product they produce.

Ownership of assets

Women generally lack having access and control over the asset at home and farm. In a patriarchal society it is a traditional practice to inherently pass on the asset to the male member. Male is considered as the head of the family universally and it is solely accepted by all. The ownership of land and property not only empowers women but dually ensures income security, playing a pivotal role in affording them a meaningful voice in household decision-making. The absence of such rights often results in a diminished status for women within

both familial and societal structures. The National Family Health Survey-5 (NFHS-5) indicates that more men own property as compared to women (GoI, 2021). Overall, 42.30% of women and 62.50% of men own a house, whereas 31.70% of women and 43.90% of men own land either alone or jointly with someone else. The asset owned by the sweet potato and the Chinese potato farm women is far less than their counterparts.

Ownership of assets empower women

- Women's property rights are integral for achieving the Millennium Development Goals, notably addressing Goal 1: Eradicating extreme poverty and Goal 3: Promoting gender equality.
- Fostering women's empowerment through land and property ownership not only advances individual well-being but also contributes significantly to broader global aspirations for a more equitable and just society.

Control over use of income

A family with a lower income is more likely to increase their family income by involving female members in farm and off-farm activities. According to NFHS 5, 49% of women, aged between 15 to 49 years, do not have the decision-making power on how to spend their own money. Women participate in most of the agricultural activities which are not hard for them to do. Even though they contribute more or less equal to men in the field, they gain half the income from their hard labour due to the wage discrimination which exists in the unorganised sector. They earn income from working in the fields, but still they do not have a say in the income they earn. Control over use of income is less than men in the case of women in tuber crops. If women have control over the use of income they allocate more budget towards purchasing nutritious foods. The income they earn from tilling their own land is associated with the size and the quality of land they own.

Income generating activities and control over income they earn leads to women empowerment

- Women if they have some money on their own they have real and perceived autonomy and rights.
- Sources of income and the ability to control that income makes women less dependent on other financial support and thus increases flexibility in life options.
- Shift in gender-specific control of income results in a shift in household expenditures.

Empowerment index

Over the last decade, the concept of empowerment has emerged as the main paradigm of development. The World Bank (2001) defines - the expansion of the freedom of choices and action, which could increase authority of women in control over resources and decision regarding their life. Women have rights and they are not able to raise their voice for

their rights and utilize their rights due to social stigma and gender stereotyping. Women are not given enough recognition for their abilities and capabilities. Women should have freedom to make their own decisions as they also have the right to live along with men. Women also have the liberty to lead a decent life. They are the caring force to bring up a family and their role in different sectors such as agriculture, industry and other productive sectors are indispensable. They should be motivated, encouraged, strengthened and their social status need to be raised and they should be empowered in all spheres of life. The empowerment level of men is more than women in tuber crops. Women empowerment level is low in the case of women involved in sweet potato and Chinese potato cultivation when compared to cassava cultivation.

Empowering women

- Women's empowerment is really needed in the societies as they are also adding to the economic strength of the country.
- It's so important for the women to develop their self-esteem, self dignity, self respect and it is very much essential for the development of the society.
- Empowering women in different aspects will help them to come out from the social stigma and they can have their rights and demands satisfied to a greater extent.

Dimensions of empowerment

- | | |
|-------------------|-----------------|
| • Power | • Skill |
| • Decision making | • Resources |
| • Autonomy | • Support |
| • Leadership | • Recognition |
| • Knowledge | • Opportunities |

Key Challenges faced by women in tropical tuber crops

Technological gap and challenges hindering tuber crops womens participation in higher-value activities in global agrifood chains and in fostering ecologically sustainable agricultural practices essential to cope with the effects of climate change and improve the livelihoods of rural women

Percolation of technologies and its adoption at farm level by farm women are limited. Despite advancements, women in rural areas are still doing agriculture in a traditional/conventional way with their traditionally gained knowledge. They do not have access neither to technology generation unit, nor technology transfer unit. The other reasons might be their social backwardness and societal restrictions. The government aims to build women farmers' capacity and access to emerging agricultural technologies and digital technologies, to ensure that they are not left behind in the digital wave and can reap its benefits while contributing to the state's growth. Technology can be crucial in supporting women's participation as they are the most vulnerable to climate impacts. However, women face many gender-based barriers to accessing technologies, and available technologies often fail to meet their particular needs. Some studies assert

that there is no gender difference in technology adoption (Muriithi *et.al.*, 2018), while others claim that joint management positively influences technology adoption (Marennya *et. al.*, 2015; Lambrecht *et. al.*, 2016).

Knowledge gap due to low education is alarming and it hinders the progressiveness of women in agriculture and prevents them from participating in skill oriented jobs

An estimated 52-75% of Indian women engaged in agriculture are illiterates and that prevents them from participating in skill oriented jobs. In fact, the typical work of the female agricultural labourer or cultivators is limited to less skilled jobs (Das, 2018). Most of the women in agriculture have less education as the preference for educating the male is given more priority. Education is a gateway to enhance women's productivity and economic status in their life. Social, cultural and economic barriers stand on their way to get broader education. This educational gap needs to be bridged with skill training, financial acumen, economic empowerment and developing entrepreneurial skill. Skills of women should be improved through education and training to drive human capital outcomes. This is essential because when women are involved in agricultural decision-making, they have unique perspectives and insights that can lead to more effective and sustainable farming practices. Providing education and training in agricultural practices, financial management, and entrepreneurship can help women increase their productivity, income, and leadership skills.

Gender gap in wages persists and women participate in agricultural work as unpaid subsistence labour and are not recognised as farmers

As farmers and agricultural labourers, women contribute significantly to food security of the country, but they are paid 22 per cent less than their male counterparts, as reported by the Ministry of Agriculture and Farmers' Welfare, Government of India. While wages of both male and female farmers increased in the last decade (2006-17), the wage disparity continues and the women farmers continue to earn less. Agrawal (2013) examined gender and social groups wage discrimination in India using India Human Development survey 2005 data and found large wage gap between gender groups and different social groups. Analysis revealed that the wage differential between men and women was largely attributable to discrimination in the labour market. However, in case of social groups this gap was mostly due to differences in endowments. In India, work of a woman agricultural labourer or cultivator is limited to less-skilled jobs like sowing, transplanting, weeding and harvesting. In Indian agricultural labour market it is often argued that the male labourers due to their greater physical strength and energy are more productive and efficient than the female labourers and hence the male labourers deserve to have better wage rates and more person-days compared to the female labourers even for the same agricultural task (Kundu, 2013). Expansion of primary education among women,

increasing the number of self-help groups and enhancement of the knowledge among women about their rights can play a significant role to reduce the male and female wage discrimination in the agricultural labour market in India.

Women are not the earning members and they depend upon men for their financial needs. Access to finance and technology often eludes women in agriculture, casting a long shadow over their farming endeavours

Income and expenditure pattern of people in a country is one of the imperative factors influencing the economic development. If women earn they mostly spend the money for their family welfare than investing in agriculture. Mostly women rely on the money lenders to meet their needs. Even the establishment of microcredit institutions and banks has made no real changes in the borrowing pattern of the women. They are still exploited by the middlemen and money lenders (Velaichi, 2022). This curtails their ability to invest in farms and adopt sustainable practices. In this situation, tailored financial services and the promotion of appropriate technologies can emerge as game-changers, amplifying productivity, reducing the workload and enhancing resilience to climate change. To obtain high income, women farmer involve themselves in various activities within their farm or outside. Those activities could increase household income and fulfil demand of the households. Higher household income could increase the ability of a household to buy food and non-food needs. Therefore, the increase in household income will substantially increase non-food consumption expenditure since food consumption has been fulfilled. Women typically invest more of their earnings in their families and communities than men. When they have control over their productive assets and incomes, their families and communities benefit with access to better food, education and health care. All attempts to develop agriculture would not be of much use until these problems are solved. Diminished crop yields due to extreme weather events translate to reduced incomes, further exacerbating existing gender inequalities.

Inequalities are reinforced by deeply ingrained customs and traditions which affects their work and mental well being

Mason and Smith (2003) stated that women's empowerment absolutely imposes that in all human societies the men commands women, or to be further specific, men control at least small segment of the women of their societal strata, especially of their families and households. For example, women's work burdens, including hours worked in agriculture, tend to decline less than men's during climate shocks such as heat stress. Few researchers stated that causes for subordinate treatment of women in society are basically the conventional ideology of society, which offers menial work to women in agriculture. Cultural norms can keep women from venturing into new, diverse and often more profitable forms of agriculture. Some of the cross-cultural differences in gender norms have deep historical roots.

Boserup (1970) hypothesized that in societies in which men had a particularly strong absolute advantage in agriculture, a norm that work was the purview of men took hold. Men because of their physical strength, could operate ploughs much more productively than women. Mobility of farm women is a psycho-social hindrance which affects their involvement in agriculture in distant farms. The extension and agricultural advisory typically disregard women as farmers and fail to provide customised training and advice inclusive of women's needs. Biased extension system, where even when women want to access knowledge and advisories, the social ecosystem makes it difficult for them to interact with male extension agents (Munshi, 2023).

Promising policy pathways for equitable benefits

We need to empower farm women with technological policies, literacy, gender equality, economic and psycho cultural empowerment. As the participation of women in agriculture and allied activities is gaining more momentum, it becomes essential to keep women at the centre of India's policy initiative.



Technological empowerment

- Gender-sensitive and bottom up approach to be adopted from the initial stages of research and development of women.
- Technologies developed by research organisations are to be transferred to the farm women through extension functionaries.
- Design gender neutral technologies, to encourage farm women to adopt it with easiness.
- Separate budget need to be allocated for developing women friendly technologies.
- Women should be given appropriate knowledge and skill about the technology through appropriate hands on training at their convenient time and place.
- Farm women should be made a part of the skill training programme by the government and other training institutions.
- Gender budgeting should be done and proper fund need to be allocated to women for getting training.
- Manufacturers should be incentivised to come up with better solutions to the problems of farm women.

- Farm machinery banks and custom hiring service centres promoted by many state governments can be roped in to provide subsidised rental services to women farmers.

Access to land and other resources

- On a subsidized basis, women should have access to high-quality inputs such as seeds, planting materials, fertilizers, and other critical farm inputs.
- Even though the farmers own the title deed of the land, government can promote co-ownership of land as a legal reform and policy and women should be treated as equal with men.
- Farm land registered in the name of a farm women may be eligible for additional advantages.
- Women may be encouraged to engage in group farming so that the inputs would be freely accessible to them.
- Policies pertaining to land leasing should be relaxed to allow women to rent land for farming.
- Unutilised land may be given to women farmers for cultivation and the resources required for cultivation may be available at the village itself.
- Roads and infrastructure need to be developed so as to facilitate the input dealers to supply input in the villages.
- Flow of information and access to communication technologies need to be improved.

Better educational opportunities

- Education infrastructure like schools, colleges and training centres are to be made available in the village and it should be more oriented towards girls and women.
- Girls be encouraged to learn with few incentives like scholarship and earn while learn concept.
- Agriculture to be made as a subject from primary level of education onwards so as to arouse their self interest and take up farming as a profession.
- Gender discrimination in education is to be eliminated in the rural areas.
- Regular awareness about the benefits of education is to be created among the rural population and adult education may be promoted in villages among the farm women.
- NGOs and other institutions are to be encouraged to provide employable skills and training to women, to equip themselves with required knowledge and skills.

Economic empowerment

- Encourage Farm Women Producer Organisations so that women can derive economic benefit out of that.
- Training should be given on village based diverse activities like value addition so that they can form small village level enterprises, produce products and market them.
- Encourage to start off small scale village based enterprises by supporting them with interest free loans.

- Collateral free lending, financial literacy training and building supportive networks are crucial steps to unlock their potential.
- Agricultural inputs need to be subsidised for reducing their input cost.
- Fairs and melas are to be organised by the government in the urban areas exclusively for the products developed by women to help them to market their products on regular basis.
- More SHGs/FIGs may be initiated to support women with group affiliation and they can earn more through the group activity.
- Promoting market and market information among women farmers.
- Gender focused financial policies and products catering to the requirements of women entrepreneurs which can spur their ability to enter into the market.

Gender equality in all spheres

- Gender neutral policies need to be formulated providing equal status to both the gender and gender neutral budgeting need to be designed to leverage women in agriculture.
- Wage discrimination in unorganised sector is to be eliminated and work done by both the gender should be treated on par.
- Social stigma and mind set of the people need to be changed by creating awareness.
- Transparent and fair compensation practices help eliminate gender-based wage gaps and ensure equal opportunities for all employees.
- Gather gender-disaggregated data before, during and after the implementation of the investment project and include women at the grass root level in the research process for desirable results.

Conclusion

For inclusive growth and development of the country the policies need to be looked through the lens of gender. The invisible women should be made visible by the effort of the coordinated and integrated effort of both government and non-governmental organisations. The hindering road blocks need to be minimised to empower women in all aspects. Governance and policy are key enabling factors in women's access to productive resources and their welfare. There is a dire need to incorporate women's need and agendas in the fields of agriculture as our country depends upon the agrarian society for food and nutritional security. Gender equity and equality is a force which reckons all the gender related issues in our country. It is time to build the capacity and support women farmers in achieving their demands and co design a future trajectory which is socially equitable.

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