POLICY
PAPER
113

Contract Farming for Transforming Indian Agriculture

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES, NEW DELHI
November 2022

Contract Farming for Transforming Indian Agriculture

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES, NEW DELHI

November 2022

CONVENER : Dr Anjani Kumar, Senior Research Fellow, International Food Policy Research Institute, New Delhi

REVIEWERS : Dr S.S. Acharya, Former Chairman, CACP, Udaipur
Dr Rajinder Singh Sidhu, Former Registrar, PAU, Ludhiana

EDITORS : Dr Pratap Singh Birthal
Dr Malavika Dadlani

CITATION : NAAS 2022. Contract Farming for Transforming Indian Agriculture, Policy Paper No. 113, National Academy of Agricultural Sciences, New Delhi, pp 20

EXECUTIVE COUNCIL 2022

President:
Dr T. Mohapatra (Delhi)

Immediate Past President:
Dr Panjab Singh (Varanasi)

Vice Presidents:
Dr Anil K. Singh (Delhi)
Dr K.M. Bujarbaruah (Jorhat)

Secretaries:
Dr P.K. Joshi (NOIDA)
Dr K.C. Bansal (Gurugram)

Foreign Secretary:
Dr Rajeev K. Varshney (Australia)

Editors:
Dr P.S. Birthal (Delhi)
Dr Malavika Dadlani (NOIDA)

Treasurer:
Dr Rajender Parsad (Delhi)

Members:

Dr J.S. Chauhan (Jaipur)

Dr M.S. Chauhan (Karnal)

Dr S.K. Datta (Kolkata)

Dr. B. Mohan Kumar (Namsai, Arunachal Pradesh)

Dr W.S. Lakra (Mumbai)

Dr A.R. Podile (Hyderabad)

Dr Ch. Srinivasa Rao (Hyderabad)

Dr C.N. Ravishankar (Mumbai)

Dr (Ms) G. Taru Sharma (Hyderabad)

Dr Ashok Kumar Singh (Delhi)

Dr Suman K. Pandey (Lucknow)

Dr R. Visvanathan (Coimbatore)

Shri Sanjay Garg, Secretary ICAR (Delhi)
ICAR Nominee

Published by Dr Sanjeev Saxena, Executive Director on behalf of
NATIONAL ACADEMY OF AGRICULTURAL SCIENCES
NASC, Dev Prakash Shastry Marg, New Delhi - 110 012
Tel: (011) 25846051-52; Fax: (011) 25846054
Email: naas-mail@naas.org.in; Website: www.naas.org.in

Preface

Markets play a catalytic role in transforming traditional subsistence agri-food systems into market-based commercial production systems. In developing countries like India, the agri-food markets are underdeveloped and imperfect, depriving farmers of the benefits of emerging opportunities in global and domestic markets. These are often crowded and have not kept pace with the growth in agricultural production. Contract farming is one of the options to make markets work, benefitting both the sellers and buyers of agri-produce. Although the Government of India has been making consistent efforts to promote contract farming, its spread has been limited, mainly to the high-value perishable commodities on account of several social, psychological and political factors. The Government of India promulgated 'The Farmers' Empowerment and Protection Agreement on Price Assurance and Farm Services Act, 2020', which was repealed later due to pursuance of a group of farmers about the positive role of contract farming in effectively and remuneratively linking farmers to markets.

Given this, the National Academy of Agricultural Sciences organized a brainstorming session to understand the efficiency, inclusiveness and sustainability and the changes required in institutional and policy frameworks to make contract farming work under the convenership of Dr Anjani Kumar. The evidence from India and abroad clearly reveals a positive impact of contracts on farm profits and negates the myth of contract farming being detrimental to the farm and household economies. I thank Dr Anjani Kumar for his efforts in collating the information and viewpoints of participants in this brainstorming in the form of this document. I thank all the participants for sharing their ideas and viewpoints on this important topic. My thanks are also due to Dr P.S. Birthal and Dr Malavika Dadlani for their editorial support.

November 2022
New Delhi

(Trilochan Mohapatra)
President

Contract Farming for Transforming Indian Agriculture

1. INTRODUCTION

Smallholder farmers in developing countries face several constraints in raising the productivity and efficiency of agriculture. These relate to the poor access to information on new farming methods, inputs and credit, biotic and abiotic stresses, un-remunerative markets, price uncertainty and high transaction costs (Ola and Menapace, 2020; Balana et al., 2020; Khandker and Koolwal, 2016; Ward and Singh, 2014; Obi and Seleka, 2011). The contract has attracted considerable interest from researchers and policymakers as a potential means of addressing some of these constraints. Contract farming in which agribusiness firms contract with farmers to receive goods at a pre-decided price with the certainty of delivery of a specified quality and quantity at a specified time, has emerged as one of the most important instruments to facilitate the integration of the value chain activities. Instead of owning farms themselves, the firms rely on farmers to produce and provide goods (Eaton and Shepherd, 2001; Singh, 2002).

Contract farming has existed for a long time, taking different forms, such as a sharecropping contract that was initially regarded as a feudal form of agriculture because the markets were either absent or underdeveloped (Eswaran and Kotwal, 1985). Initially, contract farming was a common practice in developed countries, driven principally by concerns over food safety and quality (Otsuka et al., 2016; Mishra et al., 2018; Bellemare and Bloem, 2018). Glover (1984) describes contract farming as an institutional arrangement with advantages for plantations and smallholder production. Farmers and buyers commonly use contract farming to make advance agreements on volume, specific requirements, delivery, and price.

By linking smallholder farmers to markets, contract farming reduces transaction costs along the supply chain and addresses market imperfections (Maertens and Velde, 2017; Oya, 2012; Swinnen and Maertens, 2007; Key and Key Runsten, 1999). Contract farming also reduces farmers' exposure to risk and is an incentive to increase crop production (Barrett et al., 2012; Bellemare et al., 2011; Sandmo, 1971; Baron, 1970), enabling investing in yield-stabilizing technologies (e.g. irrigation, fertilizers and improved varieties) (Liu, 2010; Michelson, 2010). As the commercial demand for agricultural commodities in the developing countries has been increasing due to income and population growth, urbanization and trade liberalization, the modern agricultural value chains, particularly the contract farming arrangements, have been emerging (Barrett et al., 2012).

Rapid income growth, particularly in Asia, has shifted consumption away from staple grains and toward high-value food commodities such as meat, fish, milk, vegetables, fruits, and processed foods (Minot and Roy, 2006). India too, has been undergoing a transition in dietary preferences away from foodgrains to high-value food commodities (Birthal et al., 2007; Kumar, 2017). Lower trade barriers and improved communication technologies expand trade linkages connecting small farmers with high-income consumers in industrialized countries. The growth in high-value agriculture, supermarkets, processing, and export-oriented agriculture suggests the growing importance of contract farming (Miyata et al., 2009).

Government policies and regulations, for example, India's Agricultural Produce Marketing Committee (APMC) Act 2003, created opportunities for agribusiness firms to obtain their raw

material requirements through contract farming, which otherwise obstructed leasing-in land beyond a limit under the Land Ceilings Act. The Act has drawn several corporate groups, multinational corporations, agricultural input agencies, and other organizations into contract farming (CF). It ensures that intermediaries or mediators do not exploit farmers. The APMC Act allows processors and contractors to procure raw materials directly from the farmers' fields (Mishra et al., 2018; Singh, 2005).

Though the potential benefits of contract farming seem to be enormous, there are apprehensions regarding the participation of smallholders and their exploitation by large processing firm's (Abebe et al., 2013; Oya, 2012; Singh, 2002; Key and Runsten, 1999; Little and Watts, 1994). Thus, in developing countries, contract farming remains a much-debated issue. In India, the role of contract farming in agricultural development and agriculture-based livelihoods has been a fertile ground for policy discourse. The debate has intensified with the promulgation of farm reform acts in 2020. However, the ongoing discussions are swayed by perceptions, and the empirical evidence is overshadowed by the rigid positions of the farmers' groups.

In this context, the National Academy of Agricultural Sciences (NAAS) organized a brainstorming session on the 'Role of Contract Farming in Transforming Indian Agriculture' on 10th March, 2021. It discussed how contract farming could help commercialize agriculture by linking farmers with modern food retail chains. The session explored the interlinkages among agricultural transformation, value chains, and contract farming. Also, it deliberated on the provisions of the Farmers' Empowerment and Protection Agreement on Price Assurance and Farm Services Act, 2020, which was repealed later. This policy paper is an outcome of the deliberations in the brainstorming session.

2. BENEFITS OF CONTRACT FARMING

Contract farming meets agricultural commodities' production, processing, and marketing gaps, which otherwise remain unattended in the traditional farming system. This institutional arrangement benefits all stakeholders on the agricultural value chain, viz., farmers, processing firms, distributors or traders, and consumers. It reduces inefficiencies in the value chain, limits price difference between farm gate and retail, minimizes wastage of perishable commodities, and ensures food safety for consumers (Roy et al., 2021; Kumar and Tripathi, 2021; Kumar et al., 2019; Kumar et al., 2018a; Kumar et al., 2018b; Kumar et al., 2016a; Kumar et al., 2016b).

A contract farming arrangement between the contracting firm and the farmers often involves provision for credit, inputs, and extension services and thus helps organize production. It also ensures markets for farm produce, particularly for high-value food crops. Contract farming benefits smallholders and agribusiness firms by significantly reducing imperfections in the spot market and reducing costs arising due to uncertainty in supply, quality, and prices. Thus, contract farming offers farmers access to markets, inputs, information, and marketing services (Otsuka et al., 2016; Mishra et al., 2018; Bellemare and Lim, 2018; Kumar et al., 2019; Eaton and Shepherd, 2001). Contract farming can enhance operational efficiency and reduce production costs by providing technologies and capital inflows in the form of inputs (Eaton and Shepherd, 2001).

Usually, the contracting firm purchases the contracted produce of specified quality facilitated by providing farmers with a wide range of managerial, technical and extension services. This helps farmers gain from the cultivation of lucrative non-traditional crops. (Kumar et al. 2016a; Kumar

et al. 2016b; Kumar et al., 2018; Glover, 1984; Goldsmith, 1985; Morrissy, 1974; Williams and Karen, 1985; Eaton and Shepherd, 2001). In some cases, the contract producers are observed to earn almost three times more than non-contract producers due to higher yields and assured output prices (Mishra et al., 2018; Kalamkar, 2012; Nagraj et al., 2008; Kumar and Kumar, 2008; Ramaswami et al., 2006; Kumar, 2006; Dev and Rao, 2005; Tripathi et al., 2005; Birthal et al., 2005; Dileep et al., 2002). The key factors that motivate farmers to contract are indirect benefits like knowledge acquisition, intangible benefits like satisfaction associated with the contract for exports, income benefits, and market uncertainty (Masakure and Henson, 2005).

The contracting agribusiness firms require a continuous supply of raw materials of desired quality for processing to fulfil the demand for processed products. While procuring the commodities as raw material from the wholesale markets may not always meet the firm's desired quantity requirements and quality standards, often creating supply uncertainties and jeopardising firm's operations, the procurement of farm produce through contracts is the most convenient alternative for the firm, mainly when non-traditional and high-value commodities are involved (Roy et al., 2021; Kumar and Tripathi, 2021; Kumar et al., 2019; Kumar et al., 2018a; Kumar et al., 2018b; Kumar et al., 2016a; Kumar et al., 2016b). Firms generally prefer to contract with a few large producers due to ease of contract management, cost-effectiveness, and lower supply risks. Therefore, firms often contract with smallholders through farmer-producer organizations or farmer cooperatives; the latter form a link between producers and processing firms (Kumar et al., 2019; Kumar et al., 2016a; Kumar et al., 2016b). Thus, through contracts, firms can overcome land constraint and achieve reliability and consistency in production (Eaton and Shepherd, 2001).

The firms must also meet stringent food safety requirements, particularly in the lucrative overseas markets. These may relate to organic produce, or maximum residual levels (MRL) of chemical pesticides mandated to be present in the products for Europe and the United States markets. Firms need to contract with farmers to procure produce of their desired specification to meet such requirements. The firms often train farmers in good agricultural practices and provide quality seeds, fertilizers and pesticides (Kumar and Tripathi, 2021). Contract farming thus helps maintain the food safety standard.

Contract farming benefits consumers by providing safe and reliable food products and reducing the wedge between the farm gate price and consumer price for primary and unprocessed products, and controlling price distortions present in the long, informal value chains that disproportionately benefit a handful of middlemen-cum-traders. This gives better price outcomes to both farmers and consumers. Consumers get food products at relatively low and competitive prices.

Contract farming may also create multiplier effects for employment, infrastructure, and market development. Further, when economic reforms in a country reduce public expenditures for credit programs, price supports, input subsidies, and research and extension, the agribusiness firms may provide these services to farmers without government resources (Warning and Key, 2002; Dirven, 1996; Schejtman, 1996). The literature cites similar benefits of contract farming in India. The contracts of Pepsi Foods and other firms with producers of tomato and potato in Punjab included procurement of contracted produce at a pre-decided price, with the provision of inputs on credit, technical advice and equipment without any cost to farmers. Contracts, in general, led to higher farm incomes and more employment (Singh, 2002). Kay Bee Exports, a contracting firm, linked the purchase price of produce from okra farmers in Maharashtra with weekly or fortnightly changes in

the export market price while providing pesticides and bio-fertilizers to maintain minimal residual levels (Kumar and Tripathi, 2021).

The evidence on inclusivity of contract farming is mixed. Several studies have pointed out that contract farming in India has been inclusive. The participation rate of small farmers in contract farming of perishable commodities in India has been reported to be between 33 to 56% (Birthal et al., 2005; Kalamkar, 2012). Similarly, in Nepal, the participation of small farmers in the contract farming of lentils, paddy seed, ginger and tomato ranged from 60 to 95% (Kumar et al., 2019; Kumar et al., 2018a; Kumar et al., 2016a; Kumar et al., 2016b). However, some evidence depicts a contrast. For instance, only 15% of contract tomato producers in Haryana (Dileep et al., 2002), and 2% of potato and 8% of basmati paddy contract producers in Punjab were small farmers (Sharma, 2016).

3. CONCERNS ABOUT CONTRACT FARMING

While most studies underscore the benefits of contract farming, some echoes concern about its limitations and negative externalities. These concerns relate primarily to the weak bargaining power of unorganized small farmers vis-a-vis large private corporations or firms. This imbalance of power may result in less favourable contract terms for producers, thereby reducing the benefits of contract farming for them (Maertens and Velde, 2017). In such circumstances, the smallholders find the contracts biased and do not adhere to contractual provisions (Kalamkar, 2012; Glover and Kusterer, 1990; Grosh, 1994). Hence, the contract agreements protect firms from all unforeseen obligations, while farmers are expected to meet the contractual obligations under all circumstances (Singh, 2002). Contract farming, thus, may become a tool for agribusiness firms to exploit an unequal power relationship with growers. Sometimes, when farmers invest in specific assets or change their cropping patterns to fulfil the contractual requirements, they become overly dependent on their contract crops, further losing their bargaining power vis-a-vis the firm, which may force them to accept less favourable or exploitative contract terms (Watts, 1994).

While both firms and farmers gain from contracts, the firms benefit more. Thus, contract farming may lower the income of smallholders as contracting firms can exercise greater market power over the farmers (Little and Watts, 1994; Glover and Kusterer, 1990). In contrast, some studies find contract farming more beneficial for large farmers than small farmers.

Some studies also find that contract farming pushes out smallholders from the market, leading to higher inequality and poverty. Therefore, small farmers are less likely to participate in contracts (Guo et al., 2005). Firms prefer to contract with farmers having large landholdings, irrigation facilities, more assets, and cooperative membership (Ton et al., 2018; Michelson, 2013; Balsevich et al., 2005; Hernández et al., 2007; Neven et al., 2009). The firms' choice to contract with large growers restrict smallholders from benefitting directly from the contract arrangements. Thus, contract farming can affect how income is distributed within a rural community, exacerbating existing patterns of economic stratification (Warning and Key, 2002; Korovkin, 1992; Key and Runsten, 1999).

Further, favouring large farmers over smallholders by the firms may also lead to differential contractual agreements for small and large farmers (Singh, 2002; Sachikoyne, 1989; Korovkin, 1992; Grosh, 1994; Little and Watts, 1994; Dunham, 1995). This means that firms' contractual agreements with large farmers are more equitable than with smallholders. For example, large

farmers' contracts may have a provision like the advance assessment of produce and advance payment and fixing of price, compared to small farmers from whom firms may pick up only selected part of the produce which meets quality standards (Singh, 2002; Grosh, 1994; Morvaridi, 1995). This divide can further deepen between the contract and non-contract farmers (Glover and Kusterer, 1990).

A concern for the contracting firms relates to default by farmers on quantity or quality or both (Glover and Kusterer,1990). As the price of a contracted commodity rises in the open market against the fixed price under the contract, the farmers are tempted to engage in extra-contractual sales. Farmers are more likely to default if the gap between the contract price and the market price is quite large. Many times, firms also default on procurement. This happens in the case of a good harvest. In such cases, firms may not procure the entire produce or become strict on quality (Singh, 2002). For example, a firm contracted farmer in Senegal to purchase melons at a fixed price but later duped them into buying melons at a lower price as the market price dropped due to a good harvest (Warning and Key, 2002). In another instance, a firm contracted for gherkin and rice seed in Andhra Pradesh but defaulted on procurement. The firm did not procure gherkin from 63% and rice seed from contract farmers. The company's default rate was higher for small farmers, possibly due to poor bargaining (Swain, 2011). In Cameroon, when farmers tried to organize a cooperative to strengthen their bargaining power, the firm abstained from procurement, wasting farmers' produce (Konings, 1998; Singh, 2002).

There is also a general perception among farmers that contracting firms may deprive them of their land. However, the literature does not mention farmers' losing their land titles upon participation in contract farming. But, questions are often raised about farmers' poor control over their land management under contracts. In a typical contract, the firm supplies all the inputs, and the farmer is just a supplier of land and labour. The political economy view of contract farming considers that contracting leads to processes of ''self-exploitation'' of farmers, and the companies gain indirect control over land (Singh, 2002). Some also consider contract farming as a mechanism for grabbing land by the contracting firm (Isager, 2021; Vicol, 2017).

Another serious concern of contract farming also relates to the environmental degradation due to the over-exploitation of natural resources (Siddiqui, 1998). Repeated cultivation of a crop under contract without crop rotation can lead to soil infestations (Glover and Kusterer, 1990; Torres, 1997). Higher irrigation intensity and increased use of pesticides and fertilizers in high-value crops vis-à-vis traditional crops also contribute to soil and water degradation.

Some externalities related to contract farming also affect food security and the welfare of smallholders. For example, most contract agreements involve high-value crops or cash crops; an over-reliance on cash crops can also make households vulnerable to food shortages and price fluctuations. Also, the powerful agribusiness corporations may collude with the domestic governments to skew policies and state resources in their favour, away from the interests of the peasants (Watts, 1994).

4. EMPIRICAL EVIDENCE ON CONTRACT FARMING

4.1 Global Evidence

While the debate on the role and impact of contract farming in developing countries remains

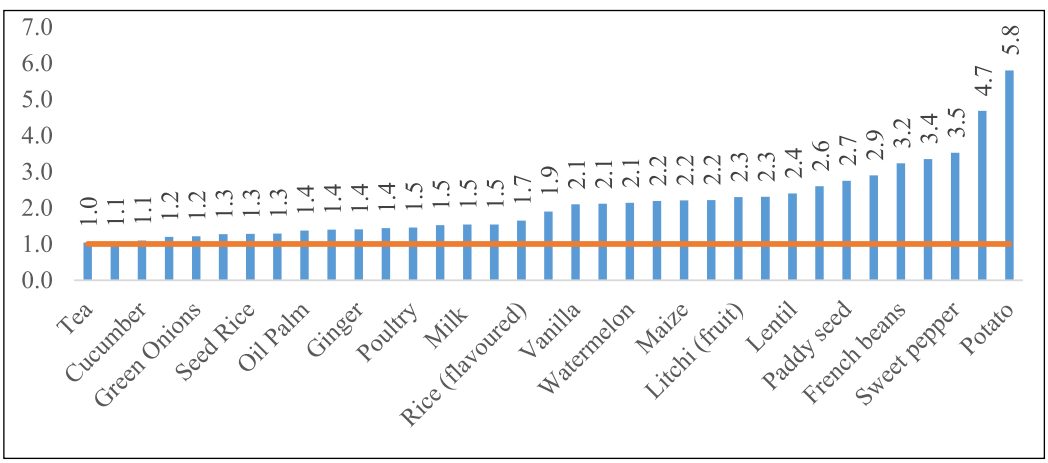
unsettled (Masakure and Henson, 2005; Winters et al., 2005; Oya, 2012; Prowse, 2012; Otsuka et al., 2016; Mishra et al., 2018; Bellemare and Bloem, 2018), the global evidence underscores the positive effects of contract farming on farmer welfare. Over 92% of the studies report a positive impact of contract farming on productivity and 75% on income. However, some recent studies also highlight a lack of consensus on the role of contract farming in improving farmers' welfare (Wang et al., 2014; Bellemare and Bloem, 2018).

To take stock of evidence on the welfare impacts of contract farming, we resorted to the concept of response ratio. A response ratio is a ratio between the mean value of the outcome indicator from an experimental group (here, contract farmers) and its mean value from a control group (here, the non-contract farmers). We referred to more than 50 research papers published in reputed journals depicting the impact of contract farming on farm outcomes: yield, production, price, gross income, and net profit. These ratios are closely related measures of proportionate change, often used as measures of the effect magnitude in contract farming. A response ratio with a value greater than one indicates a positive impact.

In figures 1 to 4, we include outcome indicators for various countries, except India. Figure 1 depicts the response ratio for various outcome indicators, taken together, for the contracted commodities. The response ratio is the highest for potato (5.8), followed by broiler (4.7), sweet pepper (3.5), tomato (3.4), and French beans (3.2). The high value of response ratio depicts a higher magnitude of benefit for the contract farmers over non-contract farmers. Khan et al. (2019) find a significant positive impact of contract farming in potatoes on price, output value, and income in Pakistan. Similarly, Simmons et al. (2005) report significantly higher net profit for contract broiler producers over the non-contract farmers in Indonesia.

The response ratio is relatively lower for tea (1.0), peanuts and cucumber (1.1), black pepper and green onions (1.2), cashew, rice seed and catfish (1.3), and oil palm and ginger (1.4), meaning lower profits for contract farmers.

Figure 1: Global impact of contract farming: response ratio for various commodities considering different outcome indicators

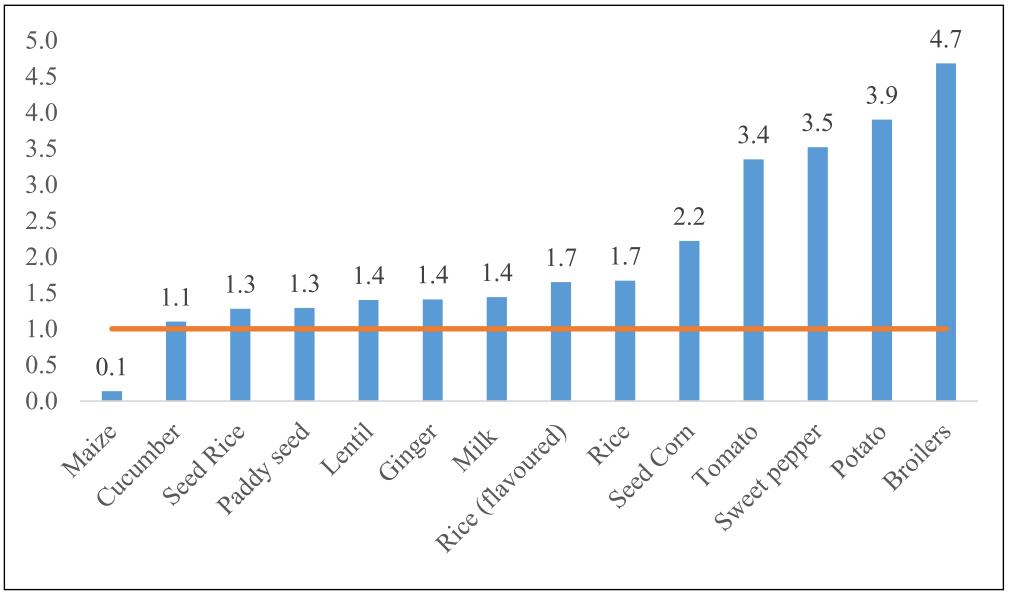


Source: Convener's estimates

We have also attempted to show the impact of contract farming on different parameters of economic welfare. Figure 2 presents the global response ratio for various commodities taking net profit as an outcome indicator. Broiler contracts exhibit the highest response ratio of 4.7 (Simmons et al., 2005). The other items with a high response ratio include potato (3.9), sweet pepper (3.5), and tomato (3.4). Schipmann and Qaim (2011) demonstrate that contract farmers earn 3.5 times higher profit in sweet pepper cultivation than non-contract farmers in Thailand. Moustier et al. (2010) depict 3.2 times higher profit for contract participants in tomato farming in Vietnam over the non-participants.

Commodities with a low response ratio include maize (0.1), cucumber (1.3), paddy seed (1.3), and lentil, ginger, and milk (1.4).

Figure 2: Global impact of contract farming: response ratio for various commodities taking net profit as outcome indicator



Source: Convener's estimates

The price realized is another indicator for estimating the impact of contract farming. Figure 3 shows response ratios. The highest response ratio is for potato (2.9), followed by scented (flavoured) rice (1.4), litchi (1.3), honey (1.2), ginger (1.2) and sweet pepper (1.1). It is in the range of 1.0 for paddy seeds, lentil, maize, rice, and cucumber. These response ratios imply that contract farming does not significantly influence producer prices.

Figure 3: Global impact of contract farming: response ratio for various commodities taking price as outcome indicator

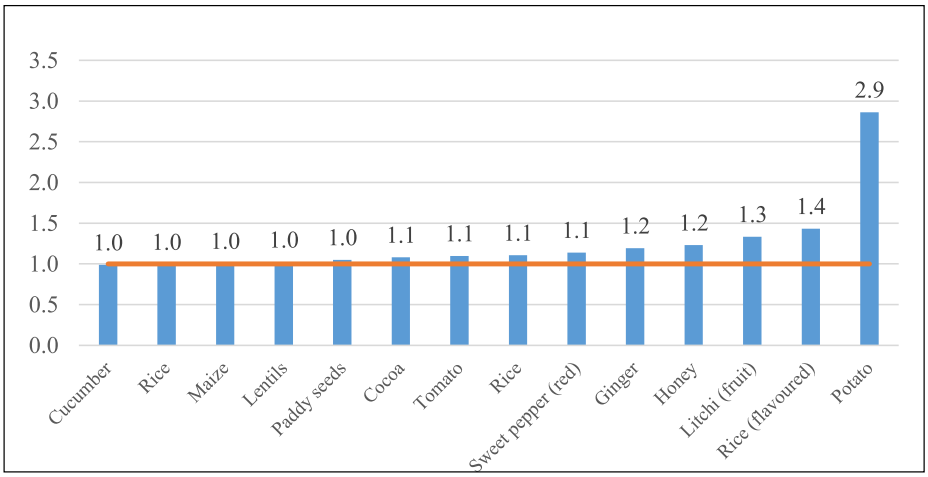
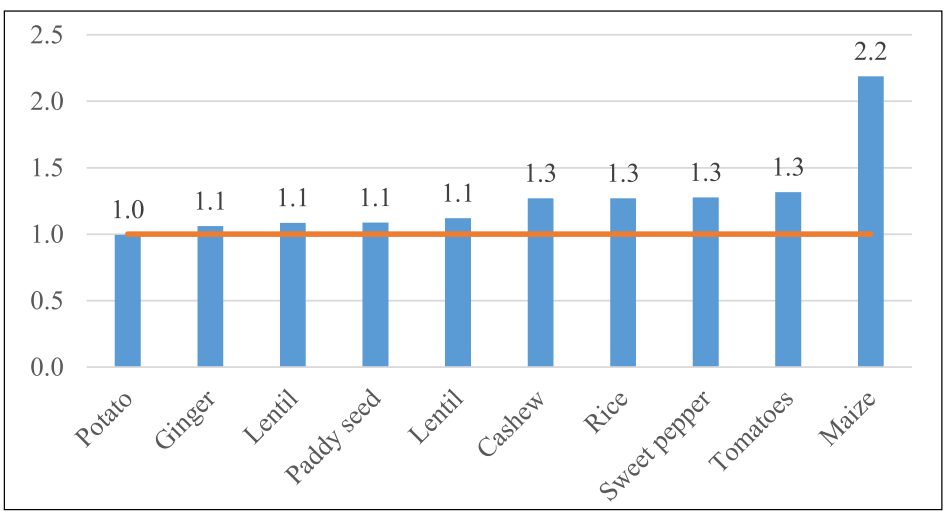


Figure 4 shows response ratios for yields. The response ratio is highest for maize (2.2) and ranges between 1.1 and 1.3 for most other crops.

Figure 4: Global impact of contract farming: response ratio for various commodities taking yield as outcome indicator



These pieces of evidence underscore the welfare impact of contract farming. Almost all commodities depict a higher value of outcome indicators over non-contract farmers. High-value commodities like broiler chickens and vegetables provide greater economic returns to contract farmers. The production of high-value commodities, in general, needs specialized production techniques, facilities and training. For example, commercial broiler production requires a significant investment

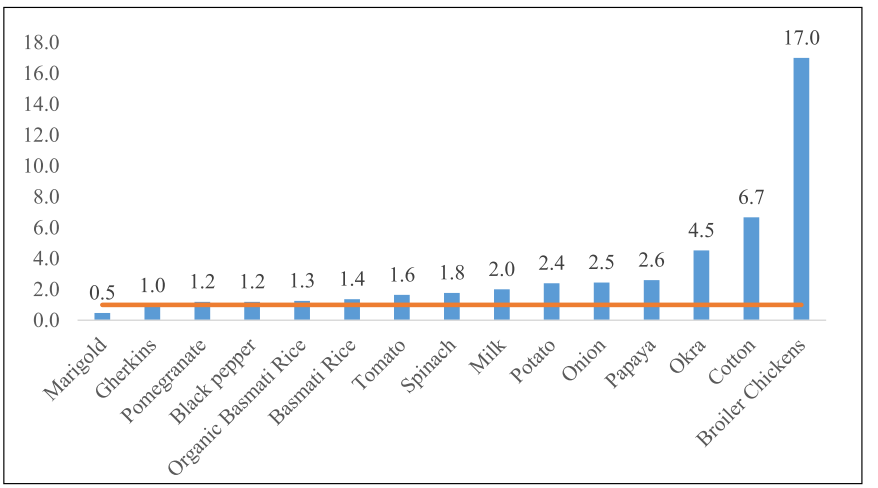
in fixed assets such as pucca broiler housing structure for birds. The broiler contract farmers receive quality inputs and follow good production practices under the supervision and guidance of the contracting firm. The contract broiler producers garner better prices for superior produce than the non-contract farmers, who usually miss the facilities and advice typically available to the contract producers (Narayanan, 2014; Roy et al., 2021). Similarly, other high-value commodities, like fresh vegetables, produced under contracts for high-end markets and exports fetch higher prices to farmers (Kumar and Tripathi, 2021). The staple commodities like cereals do not receive similar special treatment from the firm as the high-value produce.

4.2 Evidence from India

Figure 5 shows the response ratio of commodities under contract farming in India. The response ratio ranges from 0.5 for marigolds to 17.0 for broilers. This means broiler farmers benefit more from contracts. Narayanan (2014) shows a 17 times higher net profit from contract farming of broiler chickens over their non-contract counterparts. The response ratio is greater than 2 for milk (2.0), potato (2.4), onion (2.5), papaya (2.6), okra (4.5), and cotton (6.7).

However, in the case of marigolds, non-contract farmers benefit more. The response ratio is below 2 for gherkins, pomegranate, black pepper, organic basmati rice, basmati rice, tomato, and spinach.

Figure 5: Impact of contract farming in India: response ratio for various commodities covering different outcome indicators



Source: Convener's estimates

These pieces of evidence reveal that contract farming positively impacts farmers' welfare. Contract farming of high-value commodities like broiler chickens, cotton, fruits, and vegetables contributes more to the welfare.

Further, the literature indicates that small farmers benefit more from contract farming. The response ratio for net profit from milk and vegetable contracts is higher for them. For milk, the response ratio for small farmers is 2.8, much higher than for medium (1.8) and large farmers (1.2). So is in the case of vegetables. However, in the case of broilers, the response ratio for net profit is 1.1 for

small and medium farmers and 1.2 for large farmers. Large farmers can perhaps meet the broiler contracts' necessary high fixed investment requirements than the small and medium growers (Birthal et al., 2005). The response ratio for net returns in contract farming of tomato in Haryana was higher for the smallholders (1.8) than the medium farmers (1.3) but was at par with the large farmers (1.8) (Dileep et al., 2002).

In the same way, in Nepal, while the contract farmers of paddy seed earned higher unit profit than their non-contract counterparts, the difference in profit was noticeably more significant for marginal farmers (Kumar et al., 2019). The studies on contract farming of onion, okra and pomegranate in India, and lentil in Nepal, have shown a negative but insignificant impact of farm size on unit profit (Kumar et al., 2018b; Kumar et al., 2016b). However, studies on ginger in Nepal and broiler in Bangladesh suggest a significant positive impact of farm size on unit profit.

The response ratio for the same commodity also varies across regions. For example, the response ratio for net profit for broilers in India (17.0) is much higher than that in Indonesia (4.7); for milk, it is higher in India (2.0) than in Bangladesh (1.4); and for tomato, it is higher in Vietnam (3.2) than in China (1.5). The response ratio also varies by specific features of the commodity. For example, the response ratio for the price for scented rice (1.4) is higher than that for ordinary rice (1.1).

5. POLICY STATUS FOR CONTRACT FARMING IN INDIA

The Government of India attempted to encourage the decontrol of the State APMCs (Agricultural Produce Marketing Committees) and provide a legal framework to facilitate the direct sale and contract farming programmes in the country through the provisions of the Model APMR (Agricultural Produce Marketing Regulation) Act, 2003. The Act provided for compulsory registration of contracting firms, recording contract agreements, resolving disputes, exemption from levy of market fee on contracted produce, and protection of farmers' possession over their land under contract. It also provided the direct sale of farm produce to the contracting firm from farmers' fields without routing it through notified markets under APMCs. In the following years, sixteen states adopted the Model Act and took fruit and vegetables out of APMC regulation. However, Punjab brought out its own Punjab Contract Farming Act 2013. By 2016-17, twenty states amended their APMC Acts following the Model Act 2003 and fourteen notified rules related to contract farming (GoI, 2003).

Later, to enthuse confidence in farmers for participation in contract farming and incentivise firms for contracting, the Government of India brought out the Model Agriculture Produce and Livestock Contract Farming (Promotion & Facilitation) Act, 2018 (GoI, 2018). This Act, besides retaining critical provisions of the earlier Act, emphasised protecting farmers' interests and provided for setting up unbiased state-level contract farming authority to carry out mandates under provisions of contract farming, the constitution of a registering and agreement committee at the district and block levels to register contracting firms and record the contract for its effective implementation, prohibiting firm from raising permanent structure on contract farmer's land, promoting FPOs (Farmer Producer Organizations) and FPCs (Farmer Producer Companies), protecting farmer's ownership of land, ensuing buying an entire pre-agreed quantity of produce under contract, and covering contracted produce under crop and livestock insurance. The response to the 2018 Model Act was quite positive, as 19 states incorporated contract farming in their APMC Acts. By July 2020, 31 states and union territories had adopted marketing reforms, partially or wholly (GoI, 2020c).

Twenty-nine commodities or commodity groups were covered under contract farming till July 2016. These included tomato, potato, gherkin, basmati rice, seeds, cotton, chilli, oil palm, poultry, milk, medicinal plants, wheat, barley, marigold, soybean, baby corn, banana, pineapple, papaya, safflower, coleus, seaweed, aromatic crops, sweet corn, citrus, maize, and apples in 16 states viz., Andhra Pradesh, Haryana, Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Tamil Nadu, Gujarat, Punjab, West Bengal, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, and Chhattisgarh (Swain, 2016). The maximum number of contract farming schemes were for gherkin (30), followed by seeds (20).

The Government of India passed three farm laws in the Parliament in 2020 and subsequently enacted these as Acts. The Farmers' Empowerment and Protection Agreement on Price Assurance and Farm Services Act, 2020 aimed to provide a uniform regulatory law and promote contract farming (GoI, 2020a). The new Act was a simplified version of the Model Contract Farming Act and did away with the complicated system of registration/licence, deposits, and other compliances. The Act provided an assured price, inputs, and services to farmers. It also attempted to empower farmers by engaging them with processors, wholesalers, aggregators, large retailers, and exporters on a level playing field. In case of a higher market price, farmers were entitled to get it over the agreed price. The Act transferred the risk of market unpredictability from farmers to firms and enabled the farmers to access modern technology, better seed, and other inputs (GoI, 2020b).

The 2020 Act on contract farming had no provision for leasing out land by farmers to the contracting firm. The Act prohibited acquiring ownership rights or permanent modifications on farmers' lands or premises.

The Act also provided an effective dispute resolution mechanism with clear timelines. through the sub-divisional authority with the collector as the appellate authority. Further, no action for any recovery of dues was to be initiated against the farmers. If the contracting firm failed to pay the farmer, there was a provision for a penalty extending to one and a half times the owned amount. If the farmer defaulted on the agreement, the recovery could not exceed the actual cost incurred by the contracting firm for any advance payment or cost of input supplied. The state governments were given the power to make rules for carrying out provisions of the Act, like the registration of a farming agreement (GoI, 2020). However, the three farm Acts enacted in 2020, including contract farming, were repealed by the Government of India in 2021, owing to stiff opposition from a section of farmers. The farmers' apprehension related to corporates usurping their lands or forcibly taking their assets by manipulating the agreement.

It was also approached that the new farm laws might end the MSP (Minimum Support Price) based procurement of foodgrains if trading of farm produce was to be allowed in the private markets. Ít was also feared that the APMC markets would become defunct if private agricultural markets were to become operational. That added to their doubt about the electronic trading portal e-NAM that used a physical market structure in APMC markets. Farmers' apprehensions related to their weak negotiating power vis-à-vis the contracting firm in price determination and dispute settlement, doubts about large contracting firms dealing with many smallholders, and fear of losing control over their land from the influential firms. Further, the commission agents of APMC markets were concerned about trade moving to private markets. The state governments worried about losing revenue from the market fee if the trade shifted from APMC markets to private markets.

While farmers were protesting against the farm laws, the Supreme Court of India appointed a committee for their review. Based on its interactions with farmers, the report stated that most farmers (86%) supported farm laws. According to the report, the Acts intended to develop competitive agricultural markets, reduce transaction costs, and increase farmers' share of consumers' rupees. The report recommended not to repeal or suspend the laws in the interest of the majority of the farmers. The report said that the model contract agreement should be formulated and shared on the website with all stakeholders to remove glitches in its provisions and implementation strategy. It stressed expediting communication with farmers to clear their apprehensions.

6. RECOMMENDATIONS

The potential of contract farming in fulfilling critical gaps related to information, production, markets, credit and risk is well documented. Some studies also point to exploiting unorganized small farmers by the giant agribusiness firms, owing to their unequal bargaining relationship. The benefits and concerns related to contract farming are often debated in policy-making.

This paper uses outcomes of the brainstorming session on contract farming and a response ratio-based analysis of crucial outcome indicators referring to a wide range of global research studies on contract farming to assess the role of contract farming in farmers' welfare worldwide and in India. It also reviews the benefits and concerns associated with the contract farming arrangements. The brainstorming session highlights the critical role of contracts in addressing several key constraints faced by smallholders that limit their productivity and efficiency. Firms benefit from getting an assured supply of raw material in the desired quantity with required quality specifications. Consumers also benefit in terms of receiving safe food at reasonable prices. Most research studies have depicted a positive contribution of contract farming to the welfare of smallholders.

The brainstorming session brings to the fore various concerns associated with contract farming. These relate to the exploitation of smallholders by the contracting firms, primarily due to the weak bargaining position of the unorganized individual smallholders against the large corporations. The firms discriminate against smaller farmers, and favour large and resourceful farmers while contracting. Some studies have highlighted these concerns, and the topic is a fertile ground for debate.

Following the brainstorming session, a response ratio analysis was undertaken to understand better the role of contract farming in the welfare of smallholders. The research reiterates the significant role of contract farming in improving the welfare of smallholders. Contracting in high-value commodities like broiler chickens, vegetables and fruits provides more substantial welfare gains to farmers.

The Government of India has attempted to provide an enabling environment to promote contract farming, first through Model APMR Act 2003, then by Model Agriculture Produce and Livestock Contract Farming Act 2018. Around twenty states have incorporated the Model Act in their respective APMC Acts. In 2021, the Government of India repealed the recently enacted Farmers' Empowerment and Protection Agreement on Price Assurance and Farm Services Act 2020 due to wide protests by a section of the farmers. However, the SC constituted committee has found the 2020 farm laws, which were repealed, were in the interest of the farmers.

The Farmers' Empowerment and Protection Agreement of Price Assurance and Farm Services Act, 2020 was promulgated to promote contract farming and change the product portfolio favouring

high-value commodities and the agricultural transformation in India. If implemented, it would have addressed many of the concerns related to contract farming. A similar act can be brought in the future after consulting all stakeholders, particularly farmers and all political parties. The problems related to contract farming must be addressed through greater communication with all stakeholders. A regulation on contract farming that adequately protects the interests of the unorganized farmers can help in equitable formulation and implementation of the contractual agreements between contracting firms and the farmers. The insights from this policy paper will be useful in addressing the apprehensions and misconceptions related to contract farming among various stakeholders and pave the way for formulating a more acceptable contract farming Act in India. Though several measures can be taken to expand contract farming in India, a few initiatives listed below deserve consideration:

1. Government and the concerned institutions need to support and fund development of new research methodologies to draw definitive and credible conclusions regarding the relationship between participation in contract farming and smallholder welfare.
2. Participant farmers' bargaining power needs to be enhanced to increase their benefit from contract farming. To this end, the government should discourage monopoly of some agribusiness firms and further promote collective action through FPOs/farmers' co-operatives and other voluntary associations.
3. Land reform programs should be promoted to facilitate expansion of contract farming without hassles.
4. The benefits of contract farming are product and context-specific, and therefore, policymakers should develop differential strategies and mechanisms for promoting contract farming in agricultural commodities, especially in high-value commodities.
5. Government and development partners should work together with agribusiness firms to ensure that membership criteria offer equal opportunities to everybody irrespective of caste, creed, gender, and landholdings.

REFERENCES

Abebe, G.W., Bijman. J., Kemp, R., Omta, O., and Tsegaye, A. (2013). Contract farming configuration: Smallholders' preferences for contract design attributes, *Food Policy* 40: 14–24.

Balana, B., Mekonnen, D. K., Haile, B., Hagos, F., Yiman, S., and Ringler, C. (2020). Are Smallholder Farmers Credit constrained? Evidence on Demand and Supply Constraints of Credit in Ethiopia and Tanzania. IFPRI Discussion Paper 1974. Washington, DC: International Food Policy Research Institute. https://doi.org/10.2499/p15738coll2.134152.

Balsevich, F., Reardon, T., and Berdegué, J. A. (2005). Access of Small Tomato Growers to Supermarket and Traditional Markets in Nicaragua. Working paper, Michigan State University. doi: 10.1093/ajae/aas139.

Baron, D. P. (1970). Price uncertainty, utility, and industry equilibrium in pure competition. *International Economic Review* 11 (3): 463–480.

Barrett, C. B., Bachke, M. E., Bellemare, M. F., Michelson, H. C., Narayanan, S., and Walker, T. F. (2012). Smallholder participation in contract farming: Comparative evidence from five countries. *World Development* 40 (4): 715–730.

Bellemare, M. F., Barrett, C. B., and Just, D. R. (2011). The Welfare Impacts of Commodity Price Volatility: Evidence from rural Ethiopia. Working Paper, Duke University.

Bellemare, M., and Bloem, J. (2018). Does contract farming improve welfare? A review. *World Development* 112: 259–271.

Bellemare, M., and S. Lim. (2018). In all shapes and colors: Varieties of contract farming. *Applied Economic Perspectives and Policy* 40 (3): 379–401.

Birthal, P., Joshi, P. K., Roy, D., and Thorat, A. (2007). Diversification in Indian Agriculture towards High-value Crops: The Role of Smallholders. IFPRI Discussion Paper, 00727. Washington, DC: International Food Policy Research Institute.

Birthal, P.S., Joshi, P.K., and Gulati, A. (2005). Vertical Coordination in High-value Food Commodities: Implications for Smallholders. Washington DC: Markets, Trade and Institutions Division Discussion Paper No 85, International Food Policy Research Institute.

Dev, S.M., and Rao, N.C. (2005). Food processing and contract farming in Andhra Pradesh: A small farmer perspective. *Economic Political Weekly* 40: 2705–2713.

Dileep, B. K., Grover, R. K., and Rai, K. N. (2002). Contract farming in Tomato: An economic analysis. *Indian Journal of Agricultural Economics* 57 (2): 197–210.

Dirven, M. (1996). Agroindustry and Small-scale Agriculture: A Comparative Synthesis of Different Experiences: Report LC/R 1663. Santiago, Chile: Economic Commission for Latin America and the Caribbean.

Dunham, D. (1995). Contract Farming and Export Horticulture: Can Agribusiness Revitalise the Peasant Sector in Sri Lanka? IPS Agricultural Policy Series No. 3, Colombo: Institute of Policy Studies.

Eaton, C., and A.W. Shepherd. (2001). ContractFfarming: Partnership for Growth. FAO Agricultural Services Bulletin 145. Food and Agriculture Organization, Rome, Italy.

Eswaran, E., and Kotwal, A. (1985). A theory of contractual structure in agriculture. *The American Economic Review* 75 (3): 352–67.

Glover, D. (1984). Contract farming and smallholders outgrower schemes in less-developed countries. *World Development* 12 (11-12): 1143–57.

Glover, D., & Kusterer, K. (1990). Small farmers, big business: Contract farming and rural development. New York: St. Martin's Press.

Goldsmith, A. (1985). The private sector and rural development: Can agribusiness helps the small farmer. *World Development* 13 (10-11): 1125-1138.

Government of India (GoI). (2003). Marketing Infrastructure & Agricultural Marketing Reforms: Salient Features of the Model Act on Agricultural Marketing. Ministry of Agriculture and Farmers Welfare: New Delhi. https://agricoop.nic.in/sites/default/files/apmc.pdf

Government of India (GoI). (2018). Model Agricultural Produce and Livestock Contract Farming (Promotion & Facilitation) Act, 2018. Ministry of Agriculture and Farmers Welfare: New Delhi.

Government of India (GoI). (2020a). The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020. Ministry of Law and Justice: New Delhi. https://egazette.nic.in/WriteReadData/2020/222040.pdf.

Government of India (GoI). (2020b). New farm acts: Understanding the implications. NITI Aayog: New Delhi. https://www.niti.gov.in/sites/default/files/2020-11/NewFarmActs2020.pdf.

Government of India (GoI). (2020c). *State-wise status of marketing reform as updated on 14/07/2020.* Directorate of Marketing & Inspection, Ministry of Agriculture and Farmers Welfare: New Delhi. https://dmi.gov.in/Documents/Reform_Status.pdf.

Grosh, B. (1994). Contract farming in Africa: An application of the new institutional economics. *Journal of African Economies* 3(2): 231–261.

Guo, H., Jolly, R.W., and Zhu, J. (2005). Contract farming in China: Supply chain or ball and chain. In: Proceeding of the Minnesota International Economic Development Conference (MIDC05), University of Minnesota, Minneapolis, MN. April 29–30, 2005.

Hernández, R., T. Reardon, and J. Berdegué. (2007). Supermarkets, Wholesalers, and Tomato Growers in Guatemala. *Agricultural Economics* 36: 281–90.

Isager, L., Fold, N., and Mwakibete, A. (2021). Land and contract farming: Changes in the distribution and meanings of land in Kilombero, Tanzania. *Journal of Agrarian Change* 22: 36-57.

Kalamkar, S. S. (2012). Inputs and services delivery system under contract farming: A case of broiler farming. *Agricultural Economics Research Review* 25 (1): 515–521.

Key, N., and Runsten, D. (1999). Contract farming, smallholders, and rural development in Latin America: The organization of agroprocessing firms and the scale of outgrower production. *World Development* 27(2): 381–401.

Khan, M.F., Nakano, Y., and Kurosakic, T. (2019). Impact of contract farming on land productivity and income of maize and potato growers in Pakistan. *Food Policy* 85: 28–39.

Khandker, S. R., and Koolwal, G. B. (2016). How has microcredit supported agriculture? Evidence using panel data from Bangladesh. *Agricultural Economics* 47: 157-168.

Konings, P. (1998). Unilever, contract farmers and cooperatives in Cameroon: Crisis and response. *The Journal of Peasant Studies* 26(1): 112–138.

Korovkin, T. (1992). Peasants, grapes, and corporations: the growth of contract farming in a Chilean community. *Journal of Peasant Studies* 19(2): 228–254.

Kumar A., and Tripathi G. (2021). Forging linkages to promote agriculture exports through contract farming: A case study of okra cultivation. In: Bathla S., Kannan E. (eds) Agro and Food Processing Industry in India. India Studies in Business and Economics. Springer, Singapore. https://doi.org/10.1007/978-981-15-9468-7_5

Kumar, A., Roy, D., Joshi, P. K., Tripathi, G., and Adhikari, R. P. (2019). Impact of contract farming of paddy seed on smallholder farm profits: Evidence from Nepal. *Agricultural Economics Research Review* 32(1): 25-39.

Kumar, A., Roy, D., Tripathi, G., Joshi, P. K., and Adhikari, R. P. (2016a). Can Contract Farming Increase Farmers' Income and Enhance Adoption of Food Safety Practices? Evidence from RemoteAareas of Nepal. Discussion Paper No. 01524. Washington, DC: International Food Policy Research Institute.

Kumar, A., Roy, D., Tripathi, G., Joshi, P. K., and Adhikari, R. P. (2018a). Does contract farming improve profits and food safety? Evidence from tomato cultivation in Nepal. *Journal of Agribusiness in Developing and Emerging Economies* 8(3): 603-624, https:// doi.org/10.1108/JADEE-09-2017-0095.

Kumar, A., Roy, D., Tripathi, G., Joshi, P. K., and Adhikari, R. P. (2016b). Contracting by Small Farmers in Commodities with Export Potential: Assessing Farm Profits of Lentil Growers in Nepal. IFPRI Discussion Paper 1533. Washington, D.C.: International Food Policy Research Institute (IFPRI). http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/130338.

Kumar, A., Tripathi, G., Roy, D.; Joshi, P. K., and Karandikar, B. (2018b). Impact of Contract Farming on Profits of Smallholders: Evidence from Cultivation of Onion, Okra, and Pomegranate in India. IFPRI Discussion Paper 1787. Washington, DC: International Food Policy Research Institute (IFPRI). http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/133037.

Kumar, J., and Kumar, P.K. (2008). Contract farming: Problems, prospects and its effects on income and employment. *Agriculture Economics Research Review* 21:243–250.

Kumar, P. (2017). Food and nutrition security in India: The way forward. *Agricultural Economics Research Review* 30 (1): 1-21.

Kumar, P. (2006). Contract farming through agribusiness firms and state corporation: a case study in Punjab. *Economic Political Weekly* 41 (52): 5367–5375.

Little, P., and Watts, M. (Eds.). (1994). Living under Contract: Contract Farming and Agrarian Transformation in Sub-Saharan Africa. University of Wisconsin Press, Madison.

Liu, E. (2010). Time to Change What to Sow: Risk Preferences and Technology Adoption Decisions of Cotton Farmers in China. Working Paper, University of Houston.

Maertens, M., and Velde, K.V. (2017). Contract farming in staple food chains: The case of rice in Benin. *World Development* 95: 73–87.

Masakure, O., and Henson, S.,(2005). Why do small-scale producers choose to produce under contract? Lessons from non-traditional vegetable exports from Zimbabwe. *World Development* 33 (10): 1721–1733.

Maske, V. S., and Chavan, R. V. (2014). To examine the cost and returns of cotton under contract and non-contract farming situations. *Food Policy* 44: 142–157.

Michelson, H. (2010). Welfare Effects of Supermarkets on Developing World Farmer Suppliers: Evidence from Nicaragua. Working Paper, Cornell University.

Michelson, H.C. (2013). Small farmers, NGOs, and a Walmart world: Welfare effects of supermarkets operating in Nicaragua. *American Journal of Agricultural Economics* 95 (3): 628–649.

Minot, N., and Roy, D. (2006). Impact of High-value Agriculture and Modern Marketing Channels on Poverty: An Analytical Framework. Mimeo. Washington, DC: Markets, Trade, and Institutions Division, International Food Policy Research Institute.

Mishra, A. K., Kumar, A., Joshi, P. K., and D'Souza, A. (2018). Production risks, risk preference and contract farming: impact on food security in India. *Applied Economic Perspectives and Policy* 40 (3): 110–121.

Miyata, S., Minot, N., and Hu, D. (2009). Impact of contract farming on income: linking small farmers, packers, and supermarkets in China. *World Development* 37 (11): 1728-1741.

Morrissy, J. D. (1974). Agricultural Modernization through Poduction Contracting: The Role of the Fruit and Vegetable Processors in Mexico and Central America. New York, Praeger.

Morvaridi, B. (1995). Contract farming and environmental risk—the case of Cyprus. *The Journal of Peasant Studies* 23(1): 30–45.

Moustier, P., Tam, P.T.G., Anh, D.T., Binh, V.T., and Loc, N.T.T. (2010). The role of farmer organizations in supplying supermarkets with quality food in Vietnam. *Food Policy* 35: 69–78

Nagraj, N., Chandrakanth, M.G., Chengappa, P.G., Roopa, H.S., and Chandakavate, P.M. (2008). Contract farming and its implications for input-supply, linkages between markets and farmers in Karnataka. *Agricultural Economics Research Review* 21: 307–316.

Narayanan, S. (2014). Profits from participation in high value agriculture: Evidence of heterogeneous benefits in contract farming schemes in Southern India. *Food Policy* 44: 142–157.

Neven, D., Odera, M. M., Reardon, T., and Wang, H. (2009). Kenyan supermarkets, emerging middle-class horticultural farmers, and employment impacts on the rural poor. *World Development* 37:1802–11.

Obi, A., and Seleka, T. B. (2011). Investigating institutional constraints to smallholder development: The issues and antecedents. In: Institutional Constraints to Small Farmer Development in Southern Africa (Eds., Ajuruchukwu Obi), Wageningen: Academic Publishers.

Ola, O., and Menapace, L. (2020). Revisiting constraints to smallholder participation in high-value markets: A best-worst scaling approach. *Agricultural Economics* 51: 595–608. https://doi.org/10.1111/agec.12574.

Otsuka, K., Nakano, Y., and Kazushi, T. (2016). Contract farming in developed and developing countries. *Annual Review of Resource Economics* 8 (1): 353–76.

Oya, C. (2012). Contract farming in Sub-Saharan Africa: A survey of approaches, debates and issues. *Journal of Agrarian Change* 12 (1): 1–33.

Prowse, M. (2012). Contract Farming in Developing Countries: A Review. Paris: Agence Française de Développement a Savoir.

Ramaswami, B., Birthal, P.S., and Joshi, P.K. (2006). Efficiency and Distribution in Contract Farming: The Case of Indian Poultry Growers. MTID Discussion Paper No. 91. International Food Policy Research Institute, Washington, DC.

Roy, D. Tripathi, G., Islam, A.H.M.S., and Kumar, A. (2021). Contract Farming, Profitability, and Adoption of Food Safety Measures in Broiler Production in Bangladesh. IFPRI Discussion Paper 2027. Washington, DC: International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/p15738coll2.134431.

Sachikoyne, L. M. (1989). The State and Agribusiness in Zimbabwe: Plantations and Contract Farming. Leeds Southern African Studies No. 13. African Studies Unit, Department of Politics, University of Leeds.

Sandmo, A. (1971). On the theory of the competitive firm under price uncertainty. *American Economic Review* 61 (1): 65–73.

Schipmann, C., and Qaim, M. (2011). Supply chain differentiation, contract agriculture, and farmers' marketing preferences: The case of sweet pepper in Thailand. *Food Policy* 36: 667–677.

Sharma, N. (2016). Does contract farming Improve farmers' income and efficiency? A case study from Punjab. *Economic and Political Weekly* 51(40): 63-69.

Siddiqui, K. (1998). Agricultural exports, poverty and ecological crisis—case study of Central American countries. *Economic and Political Weekly* 33(39): A128–A136.

Simmons, P., Winters, P., and Patrick, I. (2005). An analysis of contract farming in East Java, Bali, and Lombok, Indonesia. *Agricultural Economics* 33(s3): 513–525.

Singh, S. (2002). Contracting Out Solutions: Political Economy of Contract Farming in the Indian Punjab. *World Development* 30 (9): 1621–1638.

Singh, S. (2005). Contract farming system in Thailand. *Economic Political Weekly* 40 (53): 5578–5586.

Swain, B. B. (2011). Contract farming in Andhra Pradesh: A case of rice seed and gherkin cultivation. *Economic Political Weekly* 46 (42): 60-68.

Swain, B. B. (2016). Contract farming and Indian agriculture: Can agribusiness help the small farmer? *Indian Journal of Agricultural Economics* 71 (3): 285-297.

Swatantra Bharat Party (2022). Report of the Supreme Court Committee on Farm Laws, New Delhi, India. https://swatantra.org.in/Documents/Report_2021_Supreme_Court_Committee_Farm_Laws.pdf.

Swinnen, J. F. M., and Maertens, M. (2007). Globalization, privatization, and vertical coordination in food value chains in developing and transition countries. *Agricultural Economics* 37: 89–102.

Ton, G., Vellema, W., Desiere, S., Weituschat, S., and D'Haese M. (2018). Contract farming for improving smallholder incomes: What can we learn from effectiveness studies? *World Development* 104: 46–64.

Torres, G. (1997). The Force of Irony: Power in the Everyday Life of Mexican Tomato Workers. Oxford: Berg.

Tripathi, R.S., Singh, R., and Singh, S., (2005). Contract farming in potato production: An alternative for managing risk and uncertainty. *Agricultural Economy Research Review* 18 (1): 47–60.

Vicol, M. (2017). Is contract farming an inclusive alternative to land grabbing? The case of potato contract farming in Maharashtra, India. *Geoforum* 85: 157–166. https://doi.org/10.1016/j.geoforum.2017.07.012.

Wang, H. H., Wang, Y., and Delgado, M. S. (2014). The transition to modern agriculture: Contract farming in developing economies. *American Journal of Agricultural Economics* 96 (5): 1257–1271.

Ward, P., and Singh, V. (2014). Risk and Ambiguity Preferences and the Adoption of New Agricultural Technologies: Evidence from Field Experiments in Rural India. IFPRI Discussion Paper 1324. Washington, D.C.: International Food Policy Research Institute (IFPRI). http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/128016.

Warning, M., and Key, N. (2002). The social performance and distributional consequences of contract farming: An equilibrium analysis of the Arachide de Bouche Program in Senegal. *World Development* 30 (2): 255–263. doi:10.1016/S0305-750X(01)00104-8.

Watts, M. (1994). Life under contract: Contract farming, agrarian restructuring, and flexible accumulation. In P. Little, & M. Watts (Eds.), Living under Contract. Madison: University of Wisconsin Press.

Williams, S., and Karen, R. (1985). Agribusiness and the Small-scale Farmer: A Dynamic Partnership for Development. London, Westview Press.

Winters, P., Simmons, P., and Patrick, I. (2005). Evaluation of a hybrid seed contract between smallholders and a multinational company in East Java, Indonesia. *The Journal of Development Studies* 41 (1): 62–89.

List of Participants

1. Dr T. Mohapatra, Secretary, DARE & DG, ICAR, New Delhi
2. Dr Anil K. Singh, Vice President, NAAS, New Delhi
3. Dr P.K. Joshi, Secretary, NAAS, New Delhi
4. Dr K.C. Bansal, Secretary, NAAS, Gurugram
5. Dr Anjani Kumar, Senior Research Fellow, IFPRI, New Delhi
6. Dr Seema Bathla, Professor, Centre for the Study of Regional Development (CSRD), JNU, New Delhi
7. Dr Khem Chand, Principal Scientist, ICAR-NIAP, New Delhi
8. Shri Ashok Dalwai, CEO, NRAA, New Delhi
9. Dr K Elumalai, Associate Professor, Centre for Study of Regional Development (CSRD), JNU, New Delhi
10. Dr K.C. Gummagolmath, Director (Monitoring & Evaluation), ICAR-National Institute of Agricultural Extension Management, Hyderabad
11. Dr. Abimanyu Jhajhria, Scientist, ICAR-NIAP, New Delhi
12. Dr. Bhushana Karandikar, Agribusiness Consultant, IFPRI, New Delhi
13. Sh. Kaushlendra, Founder and Managing Director, Kaushalya Foundation, Patna
14. Dr. Dilip Kumar, Advisor, (Fisheries), Bihar Animal Sciences University, Bihar
15. Dr. Nalini Ranjan Kumar, Principal Scientist, ICAR-NIAP, New Delhi
16. Dr. Ranjit Kumar, Head-Agribusiness Management, ICAR-NAARM, Hyderabad
17. Dr. Shiv Kumar, Principal Scientist, ICAR-NIAP, New Delhi
18. Dr. Mruthyunjaya, Former National Director, ICAR-NAIP, Karnataka
19. Dr. Arabinda Padhee, Director, Country Relations and Business Affairs, ICRISAT, New Delhi
20. Dr. Suresh Pal, Director, ICAR-NIAP, New Delhi
21. Shri Lakshmikant Pandey, Managing Director, Ananya Seeds Private Limited, New Delhi
22. Dr. (Ms.) Neelam Patel, Senior Advisor, NITI Aayog, New Delhi
23. Dr. A. Amarender Reddy, Principal Scientist (Agril. Economics), ICAR-CRIDA, Hyderabad
24. Dr. Devesh Roy, Senior Research Fellow, IFPRI New Delhi

25. Dr. Vijay Sardana, Public Interest Independent Director, Metropolitan Stock Exchange of India Ltd., New Delhi
26. Dr. Raka Saxena, Principal Scientist, ICAR-NIAP, New Delhi
27. Dr. Purushottam Sharma, Principal Scientist, ICAR-NIAP, New Delhi
28. Sh. Sachin Sharma, General Manager & Head- Channel Operations, ITC Ltd., New Delhi
29. Dr. Naveen P. Singh, Member, Commission for Agricultural Costs & Prices, New Delhi
30. Dr. Shivendra Kr. Srivastava, Scientist (Senior Scale), ICAR-NIAP, New Delhi
31. Shri Shyam Sunder, Territory Manager, Mahindra & Mahindra Ltd., Indore

Note: The designations and affiliations of the participants are as on date of BSS

65.	Climate Resilient Agriculture in India	2014
66.	Role of Millets in Nutritional Security of India	2014
67.	Urban and Peri-urban Agriculture	2014
68.	Efficient Utilization of Phosphorus	2014
69.	Carbon Economy in Indian Agriculture	2014
70.	MOOC for Capacity Building in Indian Agriculture: Opportunities and Challenges	2014
71.	Role of Root Endophytes in Agricultural Productivity	2014
72.	Bioinformatics in Agriculture: Way Forward	2014
73.	Monitoring and Evaluation of Agricultural Research, Education and Extension for Development (AREE4D)	2014
74.	Biodrainage: An Eco-friendly Tool for Combating Waterlogging	2015
75.	Linking Farmers with Markets for Inclusive Growth in Indian Agriculture	2015
76.	Bio-fuels to Power Indian Agriculture	2015
77.	Aquaculture Certification in India: Criteria and Implementation Plan	2015
78.	Reservoir Fisheries Development in India: Management and Policy Options	2016
79.	Integration of Medicinal and Aromatic Crop Cultivation and value Chain Management for Small Farmers	2016
80.	Augmenting forage Resources in Rural India: Policy Issues and Strategies	2016
81.	Climate Resilient Livestock Production	2016
82.	Breeding Policy for Cattle and Buffalo in India	2016
83.	Issues and Challenges in Shifting Cultivation and its Relevance in the Present Context	2016
84.	Practical and Affordable Approaches for Precision in Farm Equipment and Machinery	2016
85.	Hydroponic Fodder Production in India	2017
86.	Mismatch between Policies and Development Priorities in Agriculture	2017
87.	Abiotic Stress Management with Focus on Drought, Food and Hailstorm	2017
88.	Mitigation Land Degradation due to Water Erosion	2017
89.	Vertical Farming	2019
90.	Zero Budget Natural Farming – Myth or Reality	2019
91.	Loan Waiving versus Income Support Schemes: Challenges and Way Forward	2019
92.	Tropical Wilt Race-4 Affecting Banana Cultivation	2019
93.	Enhancing Science Culture in Agricultural Research Institutions	2020
94.	Payment for Ecosystem Services in Agriculture	2020
95.	Food-borne Zoonotic Diseases	2020
96.	Livestock Improvement through Artificial Insemination	2020
97.	Potential of Non-Bovine Milk	2021
98.	Agriculture and Food Policy for the Five Trillion Dollar Economy	2021
99.	New Agricultural Policy for Reshaping India	2021
100.	Strategies for Enhancing Soil Organic Carbon for Food Security and Climate Action	2021
101.	Big Data Analytics in Agriculture	2021
102.	WTO and Indian Agriculture: Concern and Possible Solutions	2022
103.	Antimicrobial Resistance	2022
104.	One World, One Health	2022
105.	Sugarcane-based Ethanol Production for Sustainable Fuel Ethanol Blending Programme	2022
106.	Utilization of Wastewaters in Urban and Peri-urban Agriculture	2022
107.	Certification of Quality Planting Material of Clonally Propagated Fruit Crops for Promoting Agricultural Diversification	2022
108.	Agri-startups in India: Opportunities, Challenges and Way Forward	2022
109.	Emergency Preparedness for Prevention of Transboundary Infectious Diseases in Indian Livestock and Poultry	2022
110.	Strategies and Approaches for Promotion of Sustainable Bivoltine Sericulture in India	2022
111.	Food Fortification : Issues and Way Forward	2022
112.	Gender and Nutrition based Extension in Agriculture	2022

Status /Strategy Papers

1.	Role of Social Scientists in National Agricultural Research System (NARS)	2015
2.	Towards Pulses Self-sufficiency in India	2016
3.	Strategy for Transformation of Indian Agriculture for Improving Farmers Welfare	2016
4.	Sustaining Soybean Productivity and Production in India	2017
5.	Strengthening Agricultural Extension Research and Education – The Way Forward	2017
6.	Strategy on Utilization of Glauconite Mineral as Source of Potassium	2017
7.	Vegetable Oil Economy and Production Problems in India	2017
8.	Conservation Policies for Hilsa and Mahseer	2018
9.	Accelerating Seed Delivery Systems for Priming Indian Farm Productivity Enhancement: A Strategic View Point	2018
10.	Renewable Energy: A New Paradism for Growth in Agriculture	2018
11.	Rumen Microbiome an Amelloration of Methane Production	2019
12.	Harnessing Full Potential of A1 and A2 Milk in India: An Update	2019
13.	Development and Adoption of Novel Fertilizer Materials	2019
14.	Innovations in Potato Seed Production	2021
15.	Potential of Transgenic Poultry for Biopharming	2022
16.	Need for Breeding Tomatoes Suitable for Processing	2022

Policy Brief

1.	To Accelerate Utilization of GE Technology for Food and Nutrition Security and Improving Farmers' Income	2016
2.	Innovative Viable Solution to Rice Residue Burning in Rice-Wheat Cropping System through Concurrent Use of Super Straw Management System-fitted Combines and Turbo Happy Seeder	2017
3.	Soil Health: New Policy Initiative for Farmers Welfare	2018
4.	Uniform Policy for Fish Disease Diagnosis and Quarantine	2019
5.	Saving the Harvest: Reducing the Food Loss and Waste	2019
6.	Better Management of Pesticides in India : Policy Perspective	2019
7.	Regulatory Framework for Genome Edited Plants: Accelerating the Pace and Precision of Plant Breeding	2020
8.	Covid-19 Pandemic: Impact and New Normal in Agriculture	2020
9.	Direct Benefit Transfer of Fertilizer Subsidy: Policy Perspective	2020
10.	Harmonization of Seed Regulations for Sustainable Food Security of India	2020
11.	Towards Revision of Biological Diversity Act 2002	2021

NAAS DOCUMENTS ON POLICY ISSUES

1	Agricultural Scientists' Perceptions on National Water Policy	1995
2	Fertilizer Policy Issues (2000-2025)	1997
3	Harnessing and Management of Water Resources for Enhancing Agricultural Production in the Eastern Region	1998
4	Conservation, Management and use of Agrobiodiversity	1998
5	Sustainable Agricultural Export	1999
6	Reorienting Land Grant System of Agricultural Education in India	1999
7	Diversification of Agriculture for Human Nutrition	2001
8	Sustainable Fisheries and Aquaculture for Nutritional Security	2001
9	Strategies for Agricultural Research in the North-East	2001
10	Globalization of Agriculture: R & D in India	2001
11	Empowerment of Women in Agriculture	2001
12	Sanitary and Phytosanitary Agreement of the World Trade Organization–Advantage India	2001
13	Hi-Tech Horticulture in India	2001
14	Conservation and Management of Genetic Resources of Livestock	2001
15	Prioritization of Agricultural Research	2001
16	Agriculture-Industry Interface: Value Added Farm Products	2002
17	Scientists' Views on Good Governance of An Agricultural Research Organization	2002
18	Agricultural Policy: Redesigning R & D to Achieve It's Objectives	2002
19	Intellectual Property Rights in Agriculture	2003
20	Dichotomy Between Grain Surplus and Widespread Endemic Hunger	2003
21	Priorities of Research and Human Resource Development in Fisheries Biotechnology	2003
22	Seaweed Cultivation and Utilization	2003
23	Export Potential of Dairy Products	2003
24	Biosafety of Transgenic Rice	2003
25	Stakeholders' Perceptions On Employment Oriented Agricultural Education	2004
26	Peri-Urban Vegetable Cultivation in the NCR Delhi	2004
27	Disaster Management in Agriculture	2004
28	Impact of Inter River Basin Linkages on Fisheries	2004
29	Transgenic Crops and Biosafety Issues Related to Their Commercialization In India	2004
30	Organic Farming: Approaches and Possibilities in the Context of Indian Agriculture	2005
31	Redefining Agricultural Education and Extension System in Changed Scenario	2005
32	Emerging Issues in Water Management – The Question of Ownership	2005
33	Policy Options for Efficient Nitrogen Use	2005
34	Guidelines for Improving the Quality of Indian Journals & Professional Societies in Agriculture and Allied Sciences	2006
35	Low and Declining Crop Response to Fertilizers	2006
36	Belowground Biodiversity in Relation to Cropping Systems	2006
37	Employment Opportunities in Farm and Non-Farm Sectors Through Technological Interventions with Emphasis on Primary Value Addition	2006
38	WTO and Indian Agriculture: Implications for Policy and R&D	2006
39.	Innovations in Rural Institutions: Driver for Agricultural Prosperity	2007
40.	High Value Agriculture in India: Prospects and Policies	2008
41.	Sustainable Energy for Rural India	2008
42.	Crop Response and Nutrient Ratio	2009
43.	Antibiotics in Manure and Soil – A Grave Threat to Human and Animal Health	2010
44.	Plant Quarantine including Internal Quarantine Strategies in View of Onslaught of Diseases and Insect Pests	2010
45.	Agrichemicals Management: Issues and Strategies	2010
46.	Veterinary Vaccines and Diagnostics	2010
47.	Protected Agriculture in North-West Himalayas	2010
48.	Exploring Untapped Potential of Acid Soils of India	2010
49.	Agricultural Waste Management	2010
50.	Drought Preparedness and Mitigation	2011
51.	Carrying Capacity of Indian Agriculture	2011
52.	Biosafety Assurance for GM Food Crops in India	2011
53.	Ecolabelling and Certification in Capture Fisheries and Aquaculture	2012
54.	Integration of Millets in Fortified Foods	2012
55.	Fighting Child Malnutrition	2012
56.	Sustaining Agricultural Productivity through Integrated Soil Management	2012
57.	Value Added Fertilizers and Site Specific Nutrient Management (SSNM)	2012
58.	Management of Crop Residues in the Context of Conservation Agriculture	2012
59.	Livestock Infertility and its Management	2013
60.	Water Use Potential of Flood-Affected and Drought-prone Areas of Eastern India	2013
61.	Mastitis Management in Dairy Animals	2013
62.	Biopesticides – Quality Assurance	2014
63.	Nanotechnology in Agriculture: Scope and Current Relevance	2014
64.	Improving Productivity of Rice Fallows	2014

For detail visit web site: http://naas.org.in

Continued on inside cover