Investigating Agricultural Theft in Japan: A Qualitative Study of Japan Agricultural Cooperatives

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Abstract

Theft of agricultural produce and equipment, especially fruit, has become a serious issue in Japan. However, current understanding of the kinds of challenges each agricultural region faces, which is important to prevent agricultural theft and farmer victimization, is limited. Against this background, the current study involved interviews of stakeholders from Japan Agricultural Cooperatives to better understand the current situation of theft of agricultural products and equipment victimization, the introduction of prevention measures, as well as cooperation with related actors in agricultural theft prevention. In total, 11 semi-structured interviews were conducted. The results demonstrate that situations of agricultural theft vary across areas, and a poor harvest may lead to higher risks of theft. It was also found that implementing agricultural theft prevention measures has been difficult due to the limited budget and an ageing population, including farmers. Additionally, in accordance with prior literature in Western nations, some farmers were reluctant to report their victimization experiences to the police. The current study highlights the need for introducing a system through which farmers can report their victimization to the police easily during the harvest season and for conducting empirical research on trends in agricultural theft with a focus on the possibility of displacement of crime. In addition, the study emphasizes the importance of implementing crime prevention measures that reflect the characteristics of rural areas and promote mutual understanding among community members.

Keywords: rural criminology; fruit theft; agricultural theft; prevention measures; Japan Agricultural Cooperatives

Acknowledgement

This study was supported by JSPS KAKENHI Grant Number 23K17782.

Introduction

In terms of research focus, compared to urban areas, criminologists have paid less attention to rural areas (Abraham & Ceccato, 2022; Mawby, 2004; Schafer et al., 2009). However, crime can implicate serious and complex issues for rural residents, and it can manifest differently from that in urban areas (Abraham & Ceccato, 2022). Donnermeyer et al. (2011) stated that even if the predictors of victimization in rural areas are similar to those found in urban areas, issues related to policing can be different.

It has been reported that agricultural victimization has become a serious situation and this can be due to the augment costs for farm facilities and the industrialization in food production (Barclay, 2016a). Donnermeyer (2024a) indeed argued that past criminological literature on crime trends in the United States has inaccurately reported that rural areas have lower crime than urban areas. Additionally, victimization of agricultural operations can be higher than comparable rates of residential burglary in metropolitan areas (Mulrooney & Harkness, 2023). Also, as the following section reviews, prior literature (Barclay, 2003; Barclay et al., 2001; Barclay & Donnermeyer, 2002, 2011; Mears et al., 2007b) reported that repeat victimization can be a serious issue in farm crime. Repeat victimization refers to cases where, within a specific period of time, the same victim experiences the same type(s) of crimes, and understanding its pattern is important for realizing crime reduction and efficient deployment of crime prevention and investigation resources (Farrell, 1995; Farrell & Pease, 1997; Ignatans & Pease, 2015; McVie et al., 2020; Weisel, 2005).

Rural areas in many advanced countries are now encountering demographic challenges due to population ageing and people moving to metropolitan areas; such trends have created the need to develop crime and safety methods and policies that reflect their specific conditions and contexts (Shimada & Suzuki, 2021). Donnermeyer et al. (2011), for instance, raised issues related to farm crime in Australia. Specifically, poor guardianship and specificities of local cultures in rural areas make it difficult for enforcement and crime prevention. Additionally, owing to limited personnel and budgets, police departments in non-urban areas may face challenges in undertaking effective community policing (Donnermeyer & Barclay, 2005; Takahashi, 2016). This means that effective and sustainable policing strategies in rural areas are likely different from those in urban areas.

Literature review

Emerging research has begun to investigate the situations of crime in rural areas. In the field of rural criminology, farm crime has been one of the main concerns among criminologists (Barclay, 2003; Barclay et al., 2001; Barclay & Donnermeyer, 2002, 2011; Ceccato, 2015; Mears et al., 2007a, 2007b; Osborne & Swartz, 2021; Sidebottom, 2013; Smith, 2021, 2020; Smith & Byrne, 2017). This can be because the victimization of farm crime negatively affects both the local and national economy (Barclay, 2016b; Mears et al., 2007b). Donnermeyer (2017) and Mears et al. (2007b) argued that the increased cost for agricultural inputs can be a factor that has risen the risk of agricultural property crime. Additionally, an online survey of farmers in the United Kingdom revealed that the experience

of agricultural crime led to deteriorated mental health among farmers (Smith, 2020). However, understanding patterns of farm crime can be sometime difficult because the official data on farm crime are limited (Ceccato, 2015; Ceccato & Dolmen, 2013; Mears et al., 2007b) and police reporting rates for farm crime are low (Barclay et al., 2004; Ceccato, 2015; Mears et al., 2007a). In this sense, empirical studies are believed to play an important role to better understand of the situation of farm crime victimization in rural areas. Among farm crime literature, those focus on theft of agricultural produce and equipment are reviewed here considering the focus of the current study, as discussed later.

There is relatively a large-scale study on farm crime conducted in New South Wales, Australia (Barclay, 2003; Barclay et al., 2001; Barclay & Donnermeyer, 2002, 2011). This study reported the prevalence of farm theft victimization among farmers, reasons for not reporting crimes, environmental factors in farms associated with the risk of theft, as well as farmers' prevention behaviors. Of 393 participants, 240 (61%) reported one or more experiences of theft of agricultural produce and equipment victimization in previous two years, and 169 (43%) reported repeat victimization. Most common target of theft was tools and small equipment (33%), followed by livestock (23%) and fuel (21%). Another study of 828 farmers in California in the United States (Mears et al., 2007b) reported that one-third or more participants experienced theft of small equipment, and about one-fifth participants reported victimization of theft of fuel in the prior year. Additionally, 17.3 percent of participants reported repeat victimization of theft of small equipment, and 5.8 percent of participants reported that of chemical or fuel theft.

Regarding reporting to the police, Barclay（2003) argued police reporting rates varied depending on the types of theft farmers experienced; higher reporting rates were noted for machinery theft compared to stock, tools, fuel, and chemical thefts. Additionally, the study reported several reasons why farmers chose not to report crime to the police, such as "Too difficult to prove" [the crime], "Difficult to tell if a crime had occurred", "Too much time had passed", "Waste of time reporting – police can't do much" and "Living in a small community, there would be problems reporting a suspect in the district" (Barclay, 2003, p. 141). These reasons for not reporting to the police have been discussed in other studies as well (Bunei et al., 2016; Ceccato, 2015; Donnermeyer, 2017; Donnermeyer & Barclay, 2005; Mears et al., 2007a).

Environmental criminology suggests that criminal activities are influenced by opportunities in the immediate environment and the movement and distribution of offenders, victims and guardians. It comprises three key explanatory approaches: the routine activity approach (Cohen & Felson, 1979), crime pattern theory (Brantingham & Brantingham, 1981), and the rational choice perspective (Clarke & Cornish, 1985). From the perspective of routine activity theory, environmental factors in farms associated with the risk of theft were also analyzed (Barclay & Donnermeyer, 2002, 2011). It was revealed that the risk of fuel and tool theft were found to be inversely associated with the visibility of farm sheds and buildings from the farm residence; the risk of fuel and tool theft decreases as the visibility of farm sheds and buildings increases. In addition, the theft of tool was likely to occur on properties

that are adjacent to a public road or major highway. A study in the United States (Mears et al., 2007b) focused on four risk factors (attractiveness, proximity, exposure and guardianship) posited by crime opportunity theory to analyze the risk of agricultural crime victimization. Drawing of a survey data of 828 farmers in California, they demonstrated that different factors were found to be associated with the risk of different types of thefts. Unexpectedly, the amount of all property marked by farmers with owner-applied numbers increased the risk of small equipment theft, and chemical or fuel theft, and using surveillance measures was found to be associated with higher risks of chemical or fuel theft victimization. They argued that a possible explanation for these unexpected results is that the causal order is reversed; farmers may be reluctant to take these types of measures until and unless they have experienced victimization. Using the data drawn from the US census, the National Incident-Based Reporting System and the 2007 Census of Agriculture, Osborne & Swartz (2021) demonstrated that population density and equipment value were found to be associated with higher risks of equipment theft.

Regarding crime prevention behavior among farmers, of 393 respondents, 64 percent said they locked their houses always when they are out; however, only about 20 percent reported they locked farm sheds, farm machinery, farm gates and fuel tanks (Barclay & Donnermeyer, 2002). A variety of security measures were taken by farmers; 70 percent of participants adopted fence maintenance, storing fuel tanks, and asking someone watch over the property when respondents are away, and a half of them adopted putting ID on agricultural produce and storing loading lamps. On the other hand, only about 15 percent of participants employed security lighting, about 10 percent of them put “No Trespass” signs, and 5 percent of them used alarm systems. A study of farmers in California (Mears et al., 2007b) reported that 85 percent of respondents reported they attended crime meetings and 75 percent of them use surveillance equipment.

As with other industrialized countries, Japan has experienced both population concentration in metropolitan regions and depopulation in rural areas. For instance, statistics show that the number of those who moved in to the Greater Tokyo Area (including Tokyo and three neighboring prefectures) is much more than that of those who moved out of this metropolitan area (Mainichi Newspapers, 2019). The main industries in the rural areas of Japan include farming and fishery. Among them, high-added value fruits, such as grapes, are one of the main agricultural products and are now highly popular. Owing to a farm labor shortage, there is a growing number of foreign laborers, working under the Technical Intern Training Program, a work training program that provides foreign nationals with employment opportunities to acquire practical skills.

Japan is known as one of the safest advanced nations. The 2017 World Bank reported that the homicide rate per 100,000 people was 0.2 in Japan compared to 1.2 in the United Kingdom and 5.3 in the United States. However, recently, theft of agricultural produce and equipment, especially fruit, has been a serious issue in nonurban areas. The theft of agricultural produce that has been carefully nurtured by farmers can lead to a decline in farmers’ willingness to engage in farming, which in turn leads to the decline of the farming

industry. In addition, high-added value fruits have become attractive targets for offenders, and new product distribution channels, such as marketplace apps, are thought to encourage the resale of stolen products.

Thefts of peaches in large quantities in Yamanashi prefecture, a mountainous prefecture that is the largest producer of grapes, peaches and plums, occurred in mid-2022 (before harvest). Specifically, 14,400 peaches, equivalent to 3.87 million JPY, were stolen within just a week (Mainichi Newspapers, 2022). Not only peaches, Yamanashi Prefecture experienced thefts of other kinds of fruits in the same year. For instance, about 15,000 peaches, 1,250 ears of corn, and 100 kilograms of cherries were stolen in June, with the total damage amounting to 5 million JPY (NHK, 2022). Other prefectures of Japan have also recently experienced large-scale farm thefts. For instance, there were 54 cases of theft of agricultural equipment from January to August 2021, and many of them targeted tractors (Asahi Shimbun, 2021). In August 2023, about 30 bags of fertilizer, each costing several thousand yen, were stolen overnight in Tsukuba City, Ibaraki Prefecture, along with about 250 bunches of shine muscat and 200 bunches of grapes (Asahi Shimbun, 2023). In Hokota City, also located in Ibaraki Prefecture, which is the largest producer of melons by municipality, approximately 600 melons were stolen from greenhouses in April 2024 (NHK, 2024).

With the cooperation of the National Police Agency, the Ministry of Agriculture, Forestry, and Fisheries published a report on the situation of theft of agricultural produce in 2019 (Ministry of Agriculture, Forestry, 2019). Specifically, the Ministry of Agriculture, Forestry, and Fisheries interviewed 218 related organizations (e.g., municipalities, Japan Agricultural Cooperatives (JAs)) located in 23 out of 47 prefectures across Japan regarding the theft of agricultural produce. This research revealed that 48 cases reported in interviews occurred in fields, and the location of occurrence was unknown in 40% of cases. Peaches, grapes, cabbage, Chinese cabbage, Chinese cabbage, apples, cherries, and strawberries were the most common items stolen. Surprisingly, it was found that only 11 percent of cases had been solved.

In response to a series of peach thefts, some municipalities in the prefecture, along with the Prefectural Police Department and JAs, introduced anti-fruit theft measures including intensive police patrols, security lighting, CCTVs, and anti-fruit theft sign boards in FY2022, along with subsidizing these anti-agricultural theft measures for JAs. The report published by the Ministry of Agriculture, Forestry, and Fisheries (Ministry of Agriculture, Forestry, 2019) states that the following prevention measures should be taken by farmers: storing harvests and tools, locking windows and entrances to greenhouses and storage facilities, wearing armbands, marking farm vehicles with stickers, installing nets and fences, putting anti-fruit theft sign boards, and installing security lighting and CCTVs. Additionally, in terms of measures to be taken by local communities, the report states that the following are encouraged to be taken: issuing written warnings to farmers, disseminating information on agricultural theft in the meeting and via SNS, performing patrols, and sharing information on suspicious persons and vehicles.

These proposed measures are considered effective in agricultural theft prevention from the perspective of environmental criminology. For example, patrols are expected to intimidate potential offenders, discourage them from committing crimes, and raise the crime prevention awareness of those involved in these activities. As with patrols, CCTV, and sensor alarms and lighting are also expected to intimidate potential offenders. In addition, their effects extend beyond the farms where they are installed, since potential offenders think that there may be CCTVs, and sensor alarms and lighting installed in the surrounding farms as well. This is called "diffusion of benefits"; the areas that were not the targets of the intervention experience crime reduction (Bowers et al., 2004; Braga et al., 1999; Clarke & Weisburd, 1994; Sherman & Rogan, 1995; Weisburd & Green, 1995). Sign boards, armbands, stickers on farm vehicles are expected to work as an identification of concerned persons. Disseminating information on agricultural theft is expected to raise the crime prevention awareness of farmers and promote anti-theft measures among the stakeholders.

Current study

In emerging research on agricultural theft, the focus has largely been on Western countries, as discussed above, and less is known about this issue in the Japanese context. Additionally, although prior studies on farm thefts in the Western advanced nations mainly focused on thefts of equipment, fuel, or livestock (Barclay, 2003; Barclay et al., 2001; Barclay & Donnermeyer, 2011; Mears et al., 2007b; Osborne & Swartz, 2021), main targets of farm thefts in Japan are considered agricultural produces, especially high-added value fruits. In this sense, situations of farm thefts in Japan can be quite different from those in the Western advanced nations. Comparative analysis of studies on rural crime from different areas is therefore required for the development of the field of rural criminology (Donnermeyer, 2024b).

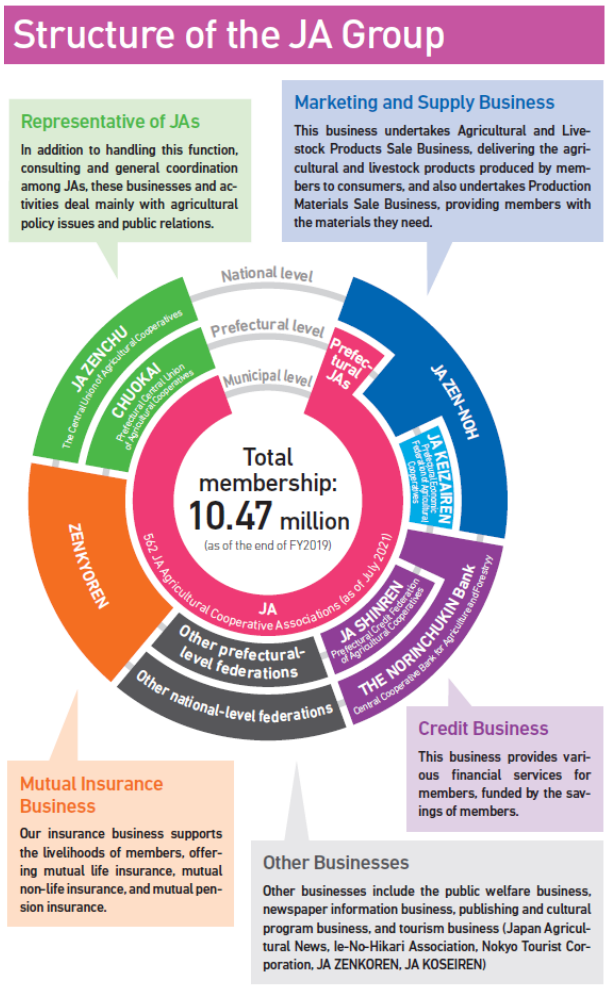
As such, it is imperative to conduct research to explore the current situation of theft of agricultural products and its prevention at the local level in Japan. Additionally, although the government has suggested farmers to take prevention measures, it is still unclear if the farmers do so, and if they perceive these suggested measures are effective in agricultural theft prevention. To realize cooperation for agricultural theft prevention at the local level, it is important to understand how stakeholders think about the current situation of agricultural theft victimization, how anti-agricultural theft measures have been introduced, as well as the extent of cooperation with related actors in crime prevention. Stakeholders involve JAs, farmers themselves, members of local communities, the police, as well as the local governments that are expected to play an important role in agricultural theft prevention. However, to the authors' knowledge, no prior research has investigated the situation of agricultural theft, as well as stakeholders' attitudes toward situations related to agricultural theft in the Japanese context using a qualitative research method, though a systematic review of rural criminology research has reported that of 358 papers published between 1980 and 2020, about 50 percent adopted qualitative methods (Abraham & Ceccato, 2022).

The current study therefore addresses this gap in the literature; with a focus on thefts of agricultural produce, especially fruit, the study involved semi-structured interviews with

stakeholders from JAs across the country. JAs have played an important role in managing community agriculture, and their activities include credit business, marketing and supply business, mutual insurance services, as well as education for farmers (Oikawa, 2019; Zen-Noh, 2024). As shown in Figure 1, JAs consist of three levels of federations, at the national, prefectural, and municipal levels (Zen-Noh, 2024), and as of July 2024 there 506 municipal-level JAs. In our semi-structured interviews, stakeholders from municipal-level JAs were asked about the current situation of agricultural theft, cooperation with related actors in crime prevention, as well as their demands regarding support from the local authorities (details presented below). Since JAs are considered to have a crucial role in agricultural theft prevention as well, it is believed interviewing them shed new light on the understanding of the current situation of agricultural theft and its prevention at local level in the Japanese context.

Figure 1

Structure of the Japan Agricultural Cooperatives Group (Source: Zen-Noh, 2024)



Data and methods

The data used in this study come from authors' project on agricultural theft in Japan. Stakeholders from JAs were recruited from a sample of participants who responded to a questionnaire survey of JAs regarding fruit theft that the authors administered prior to the current study as part of mixed methods piece of work of the project. Specifically, at the end of the survey, the respondents were asked if they would like to cooperate with us further and participate in an interview on the topic. A total of 563 stakeholders from JAs were invited to participate in the survey, of which 260 completed the survey (response rate = 46.2%). Further, 28 participants agreed to participate in the post-survey interview, and among them, 11 JAs were selected for the interviews since they reported the recent experiences of agricultural theft victimization, and their experiences were expected to provide new insights into the agricultural theft in rural areas of Japan. All the participants are from departments responsible for agricultural management, and are from nine different prefectures. Three interviewees (Nos. 9−11) are from Yamanashi Prefecture, which has witnessed large-scale thefts in recent years. The other interviewees are from Tochigi Prefecture (No. 1), Shizuoka Prefecture (No. 2), Aichi Prefecture (No. 3), Tokyo (No. 4), Yamagata Prefecture (No. 5), Shiga Prefecture (No. 6), Ehime Prefecture (No. 7), and Chiba Prefecture (No. 8). Classifying the regions, Nos. 3 and 4 are from highly urbanized areas; Nos. 1, 2, 6, and 8 are from suburban areas that supply vegetables and fruits to metropolitan areas; and Nos. 5, 7, 9, 10, and 11 are from areas that produce a large number of fruits.

The 11 JAs were interviewed by one to four interviewers between May and September 2024. The interviews were conducted in different formats – face-to-face, online, or telephone – depending on interviewees' preference. First, the objectives of the current study were briefly explained, and then interviewees were asked about their willingness to participate in the interviews and were informed about the clauses of anonymity and confidentiality as well as audio or video recording as part of data collection. After the relevant clarifications, the interviews were scheduled. These had an average duration of 30–90 min. Since the current study employed a semi-structured interview format, the questions asked varied across interviews. Yet, questions on the following themes guided all the interviews:

- Current situation of agricultural theft
- Examples of theft cases experienced and the images of offenders
- Current situation of cooperation with different actors in agricultural theft prevention
- Prevention measures taken and how JA personnel ask farmers to take prevention measures against agricultural theft
- Issues related to reporting to the police
- Perceived effectiveness of prevention measures among the farmers
- Demands regarding support from the local police and governments for implementing prevention measures

Results

Current situation of agricultural produce theft

Since different areas of Japan harvest different products, the situations of agricultural theft differed across JAs. Many participants reported the theft of fruits and vegetables. The most commonly mentioned target was grapes, especially high-added value ones (shine muscat), as five of the interviewees indicated that these were regularly stolen within their respective areas. Other commonly mentioned targets included peaches (N=3), cherries (N=2), melons (N=2), persimmons (N=2), citrus fruits (N=2), sweetcorn (N=2), strawberries (N=1), pears (N=1); plums (N=1), kiwis (N=1), pumpkins (N=1), tomatoes (N=1), and bagged rice (N=1). Although the interviewees are from areas where the main produce is fruits, they have witnessed other kinds of agricultural theft as well. For instance, No. 1 reported the theft of bagged rice, and in some cases, at night, burglars themselves brought their own combine harvester and harvested rice. Neighboring residents noticed their activities; however, they thought that the burglars were dedicated farmers and did not think that their activities were suspicious.

Additionally, four of the participants reported the theft of machinery, tools, and small equipment. For instance, No. 1 reported:

> *When a combine harvester was left in the rice field, it was gone the next day. Also, a tractor has been stolen in the same way.*

No. 9 reported thefts of stepladders and cables. No. 7 also reported stepladder theft, remarking that everything in the fields can be burgled. No. 11 reported thefts of channel grates as well as sprinklers. Specifically, about 100 sprinklers were stolen, and its damage amounts to 700,000−800,000 JPY. In addition, there was the theft of the brush cutter; the shutters of a farm shed in a field have been crushed and the brush cutter stored in the shed was stolen.

Trends in agricultural theft (e.g., extent, types of items stolen) differed depending on the participants. For instance, Nos. 2 and 6 mentioned coming across just one case of theft of produce and equipment in recent years. No. 8 stated not having experienced agricultural theft in recent times, but mentioned that many such cases occurred approximately 10 years ago. No. 10 witnessed thefts of fruit in large quantities two years ago and mentioned that although there were small cases of peach, plum, and grape thefts last year, a large-scale theft had not taken place for two years. Similarly, No. 11, who also encountered a series of large-scale fruit theft and is from the same prefecture as No. 10, mentioned that there has been no large-scale theft of fruit in the last two years.

Regarding trends in items targeted, No. 4 stated that thefts of tractors have not occurred in the last 10 years, although those of agricultural produce, such as vegetables, have still been occurring. Meanwhile, although No. 6 recently experienced very few cases of

produce theft, thefts of faucets have occurred frequently. It can be said that this situation shows the versatility of criminals but also how these crimes are demand driven.

Interestingly, agricultural produce with poor harvest outcomes have been a target of theft:

> *Thefts of cherry have increased and this could be because they have had a poor crop of peach this year. Additionally, after the harvest period of peach had ended, thefts of plum have started to occur. The number of cases of plum thefts have increased and this can be because offenders had heard that the amount of production of plum is relatively little in this year*. (No. 11)

In this regard, No. 8 feared that media reports about price surges can make people think that theft of agricultural produce is acceptable in order to make a living, which can aggravate the problem.

Examples of theft cases experienced and the images of offenders

Interviewees shared examples of agricultural thefts experienced in their areas.

> *In only one case, the offender of the theft was caught. The offender was a 58−59-year-old individual, not a farmer. He was caught when his moving flashlight was noticed. Thefts had occurred about three times in the same field before he was arrested.* (No. 7)

> *It was a group of Vietnamese who did a large-scale theft [of peaches] two years ago. At that time, fields were targeted at random. Even persimmons left just in front of the houses were targeted in the worst case*. (No. 9)

Although some interviewees explained that they perform intensive patrols late at night, some instances of theft occurred during other periods of time:

> *Farmers work from the morning and return home in the afternoon, so daylight hours are often a blind spot.* (No. 9)

The interviewees described certain images of offenders of agricultural theft as well.

> *Thefts of strawberries, pears, and grapes are probably committed by a knowledgeable person. They understand the harvest time. Pears can be taken without scissors, and I think they understand how it works…If they are doing hands-on training, they can gain knowledge. I think people who know the sales channels may connect with foreigners*. (No. 1)

> *A person who is familiar with how to steal, a professional*. (No. 5)

> *I may be biased, but I feel that the number of people who do not speak Japanese has been increasing recently, and at the same time, the number of thefts has also been increasing*. (No. 3)

> *I think it is half-and-half—amateurs and restaurants. If 20 cabbages are stolen, it is thought to be a restaurant or for resale*. (No. 4)

Some interviewees have certain notions on what characteristics make the fields more attractive to potential offenders. It seems that isolation, such as a dead end, can be attractive to offenders as less likely to be caught. Specifically, No. 11 argued that fields that have not been entered for days are more likely to be targeted for thefts and those located on a dead end are less likely to be so.

Current situation of cooperation with different actors in agricultural theft prevention

Interviews revealed that different actors have been involved in agricultural theft prevention. The most commonly mentioned actor was the police, as seven interviewees mentioned they have cooperated with the local police in agricultural theft prevention.

> *We organize an online seminar on agricultural theft with the local government, introducing actual cases of agricultural thefts that occurred in their area, and the prefectural police and the crime prevention products company participated in the seminar*. (No. 1)

> *We ask the local police to have a meeting on agricultural theft prevention for farmers and us every year, as well as intensive night patrol…During the meeting, we inform the police about the wishes from farmers. If there are any questions from farmers in advance, they are also communicated to the police during the meeting*. (No. 2)

> *The police have told us to keep an eye on the area if there are any strangers…We have set up a task force with the local police and municipality every May since about twenty years ago, and we ask the local police to perform intensive patrols when thefts occur*. (No. 5)

> *We invite local government officials and police officers to attend the seminar on cultivation for farmers to talk about agricultural theft prevention. During the harvest season, police officers stationed at chuzaisho (residential police box) patrol intensively until around 8pm… The officers stationed at chuzaisho in mountainous areas are doing their best*. (No. 7)

> *Even though the person in charge has changed, the cooperation with the police department continues*. (No. 9)

> *If a theft occurs, the police come immediately*. (No. 11)

Nos. 5 and 9 stated that in the beginning of the harvest seasons, a departure ceremony of patrols for agricultural theft prevention is held. Additionally, No. 2 mentioned an interesting arrangement developed to cooperate with the local police for agricultural theft prevention; in the region, each field is numbered and a piece of paper with the number written on it is put up in the field. Since a list of the numbers and the names of the farmers has been submitted to the police, the officers can easily track who the field belongs to when a theft occurs. No. 2 added that there have been no particular complaints from farmers about giving their information to the police for the purpose of agricultural theft prevention.

Some JAs have cooperated with local governments for crime prevention as well. As described above, some JAs ask the local governments to attend seminars organized by them to strengthen the cooperation and disseminate knowledge on agricultural theft prevention among farmers. No. 7 said although farmers themselves basically are responsible for patrols in their communities as a self-defense, local people, the local government, and No. 7 do patrols as well. However, No. 6 mentioned not engaging in crime prevention activities in cooperation with different actors, such as local governments, in agricultural theft prevention because it is presently difficult due to a merger of municipalities.

Prevention measures taken and how JAs ask farmers to take prevention measures against agricultural theft

Interviews revealed that diverse interventions for agricultural theft prevention have been implemented.

Patrols

For instance, patrols have been conducted in several regions that the interviewees are from. Three JAs operating in Yamanashi Prefecture have performed patrols with different actors.

> *Patrols are conducted by local governments, the fire brigade, and the crime prevention association. They do patrols by 12 patrol cars with blue lighting (patrol cars used by the public) from 8 am to 5 pm, that is, during their office hours. The police direct the patrols. A series of patrols are to fill in the blanks of patrols by us. We go to the site with information from them, such as a suspicious foreigner*. (No. 9).

> *The local government and the security company do patrols. Patrols by the security company are conducted from 8 pm to 4 am with three patrol cars*. (No. 10).

> *We put two people in patrolling and the municipal office also has a team for patrolling… The Junior Chamber [a local organization for young people] began participating in patrols this year. The president of the Junior Chamber came to us out of the blue and offered to help [patrol]…both the local government and we use patrol cars with blue lighting. The Junior Chamber patrol by a car, which is some kind of recognizable sign*. (No. 11).

Additionally, Nos. 1, 10, and 11 stated that they use the information on victimization collected by farmers and the police on their patrol routes.

> *We change where we focus on while patrolling using the information from the members. We also obtain the information from the police and use it during the patrols*. (No. 9)

> *We talk with the local government and decide the patrol routes based on the data we collect. Specifically, we collect information on victimization that has not been reported to the police and refer to it when setting the routes*. (No. 11)

CCTV

Introducing CCTVs was one of the most common interventions among the interviewees (see Figure 2 which illustrates cameras which farmers might acquire).

Figure 2

CCTV (No. 9)

As stated above, some municipalities in Yamanashi Prefecture offered CCTV subsidies to JAs in the prefecture. Nos. 9, 10, and 11, working in Yamanashi Prefecture, lent subsidized CCTV and trail cameras that they bought themselves to their members (see Figure 2). For instance, No. 9 reported that 789 CCTVs were introduced two years ago, 67 were introduced last year, and seven were introduced this year. In addition, No. 11 reported that they rent out to farmers CCTVs with sensors for 18,000 JPY per month, and 60 CCTVs are currently available for rent. Other JAs have also introduced CCTVs; No. 6 said they put CCTVs in their jurisdictions, and monitor them from the office.

Sensor alarms and security lighting

In addition to CCTVs, three participants said sensor alarms and security lighting have been used for agricultural theft prevention. For instance, No. 9 reported that there were 183 sensor lighting units two years ago. No. 10 also has used CCTV, and they lend sensor alarms and lighting to farmers as well.

Sign boards and banners

Five interviewees mentioned that they put up anti-agricultural theft sign boards or banners in the fields or neighborhoods.

> *The prefectural office made the banners*. (No. 1)
>
> *We made a poster at the request of farmers.* (No. 4)
>
> *We made anti-fruit theft sign boards. We made them two years ago, but since they were small, we made larger ones this year*. (No. 9)
>
> *Some farmers put up a sign saying "Danger High Voltage."* (No. 6)

Other prevention measures

Other prevention measures the interviewees mentioned included those using caps, dogs, and traps. No.5, specifically, distribute orange caps to farmers to differentiate them from others, and No. 7 let the dogs loose in the greenhouses during harvest time and use mousetrap-like devices to catch offenders.

Issues related to installing security measures

Since the installation of security measures requires money, some interviewees remarked that it is difficult to force farmers to take such measures by themselves:

> *Although we hold an information session on security measures such as CCTVs or home security, it is totally up to the farmers to implement them. We try to tell the farmers to seek advice from the crime prevention products company.* (No. 1)
>
> *We ask the farmers to take prevention measures, but it costs money, so we put up flags and lighting instead*. (No. 5)
>
> *I have heard the best measure is CCTV, but to install it is costly because electricity must be used for the greenhouses*. (No. 7) (see Figure 3**)**
>
> *Whether or not 18,000 JPY [for CCTVs with sensors lent by JAs] is expensive depends on the person*. (No. 11)

Figure 3

Greenhouses (No. 7)

To support farmers to take prevention measures in a financially sustainable way, No. 3 mentioned buying security items and equipment in bulk from vendors and selling them to farmers at a discount. Further, as the farmers grow older, some JAs have encountered difficulties in the implementation of prevention measures against agricultural thefts by the farmers themselves. No. 8 mentioned, for instance, that even if thefts were to become serious issues now, asking farmers to patrol may not be an option because it can be dangerous considering their age. No. 6 also stated that until five years ago, farmers themselves would patrol at night in turns; however, security guards are now hired by JA to patrol as farmers have grown older. Additionally, according to No. 11, even when CCTV subsidies are provided by the local government to older farmers, they ask young farmers to help install the CCTVs at home since older farmers may not be familiar with such machinery.

The interviews revealed that farmers are not equally eager in taking prevention measures against agricultural thefts. For example, No. 9 stated that although efforts have been made in collaboration with the local police to encourage farmers to install CCTVs, the number of CCTVs used has not increased. No. 2 mentioned that those who own direct sales shops are more eager in taking prevention measures.

> *Farmers do not properly recognize how expensive their machines are, and they can forget the importance of protecting their machines even if they have been victims of thefts in the past…Farmers have no practice of locking their plastic greenhouses [to prevent thefts] since in our area, people do not lock even their houses*. (No. 8)

> *For some reason, farmers assume they are safe, so I feel that it is necessary to change their awareness on this issue*. (No. 9)

Further, some prevention measures are now difficult to implement due to the likelihood of complaints from neighbors. According to No. 3, a JA operating in the metropolitan area,

> *We cannot use sensor alarms and lighting because we operate in the metropolitan area and the noises and lights they causes can cause complaints from the neighborhoods. What we can do is to physically protect the fields by setting up fences* (see Figure 4).

Figure 4

Defensive Fences (No. 3)

Nos. 9 and 11 also mentioned that they do not use public address announcements to warn farmers about agricultural theft since this can lead to complaints. Therefore, No. 9 said they use emails and fax instead.

The interviewees asserted that information from the farmers and members of the community are important for crime prevention:

> *We talk with farmers about suspicious people seen in the neighborhoods*. (No. 2)

> *Reports from the community are a valuable source of information. They are watching the community very carefully. They give us information by phone or in person any time. Farmers give us information when they ship their products*. (No. 9)

Issues related to reporting to the police

A few interviewees reported that some farmers are reluctant to report their victimization experiences to the police. Nos. 7 and 9 stated that farmers would not waste time

to report to the police during the harvest season. No. 10 also reported that farmers are aware of the associated issues they can be caused if they report their victimization to the police, such as the subsequent crime scene investigation. Instead of reporting to the police, No. 9 mentioned that famers sometimes reported their victimization to them, instead of the police:

> *Many famers report their victimization to JA [rather than the police] because it takes up half a day for crime scene investigation.* (No. 9)

Meanwhile, whether farmers report such crime to the police can depend on what agricultural produce or machine is stolen. For instance, No. 1 said they believe that if agricultural machines are stolen, farmers basically report to the police because it is impossible to continue their business without them.

Perceived effectiveness of prevention measures among the farmers

According to the interviewees, many farmers think that the installation of CCTVs, sensor alarms, and security lighting is effective in agricultural theft prevention. No. 1 even mentioned the efficacy of dummy CCTVs in preventing thefts.

> *Burglars will not know if it is real or a dummy. A dummy CCTV can be a threat for them, and they avoid the area if there is CCTV. I think we need dummy CCTVs that are inexpensive and look like they are working*. (No. 1)

Importantly, No. 9 stated that CCTVs are considered valuable to protect the harvests, not necessarily to arrest the offenders. However, some interviewees believe that the installation of CCTVs is not enough and that the position of CCTVs needs to be changed depending on the agricultural produce.

> *Even if a CCTV is installed, the black-clad offenders cannot be identified…It is difficult to install a CCTV in the peach fields because there are no props. In addition, the position of the CCTV needs to be changed because the type of peaches that are about to be harvested changes with the time of year. The CCTV should not be left in the same place all year round.* (No. 9)

Interviewees stated that physical barriers to the fields are also considered effective.

> *Farms and plastic greenhouses that are netted are less likely to be the targets of thefts.* (No. 9)

The interview data indicated that some interviewees are not sure about what prevention measures are effective. No. 4 mentioned that farmers have no choice but to install CCTVs, sensor alarms, and home security systems. Additionally, many farmers in No. 2's jurisdiction have installed CCTVs simply because they consider it an "amulet" that makes farmers feel safety. Further, initiated by the local government, drones have been tested for fruit theft prevention; however, the interviewee was skeptical about its effectiveness:

> *Two years ago, our local government tried drones [considering the possibility of using it as a prevention measure]. It got a lot of media attention, but each drone flight costs money, so we told the local government that given the costs, it would be better to use the money to invest in other security equipment. The local government then said that they will reconsider other prevention measures to invest from next year on* (No. 9)

Demands regarding support from the local police and governments for implementing prevention measures

During the interviews, some specific demands for the police were shared.

> *I think just having a patrol car on the road would be effective in preventing crime. Even if they patrol at the same time of day, we would like them to take different routes or pass in front of houses where there are no people*. (No. 1)

> *Agricultural theft is like shoplifting after all; unless someone is killed or something, the police don't take it seriously*. (No. 7)

A few interviewees demanded financial support for implementing security measures.

> *The local government said theft of agricultural produce is the same as shoplifting, and subsidies could not be given only to agriculture without giving them to the shopping district*. (No. 4)

> *If thefts were to occur more frequently now, we would ask the municipal office for subsidies. That is our job and the person in charge attends various meetings for that purpose*. (No. 8)

> *The subsidy for implementing prevention measures such as CCTVs or security guards by the local government is no longer available and it is difficult to outsource to security companies by ourselves*. (No. 11)

Discussion and conclusion

Changes in various aspects of social structure have been happening in rural areas of Japan (e.g., limited budgets, increased number of ageing famers), and it makes rural areas vulnerable to agricultural crimes. Dealing with these changes, different solutions have been introduced to prevent agricultural theft victimization, such as security measures, and collaborative patrols between various stakeholders. However, they are not evidence-based, and it is still questionable if they are sufficiently implemented. Employing a qualitative research approach, the current study sought to address the issue of agricultural theft, especially fruit theft, and the barriers to cooperation for agricultural theft prevention at the local level in the Japanese context. Eleven respondents from JAs participated in the study, and a series of semi-structured interviews were conducted. In this section, we discuss the

results based on the interview data and conclude by presenting the implications for future research and policymaking.

The results revealed that the situation of theft of agricultural products is different depending on the areas targeted and what items the farmers produce. Importantly, it was found that the same areas do not experience the same scales of victimization every year, and targeted items differ depending on the year as well. As described above, some respondents reported thefts of fruit in large quantities two years ago; however, they have not experienced similar cases for two years. In addition, the study showed that different items can be targets of thefts depending on the year or season, and one respondent mentioned that agricultural produce with poor harvest outcomes can be a target of theft. Importantly, prior research in the United States reported that the trends in some agricultural theft showed seasonal patterns and they can be affected by the demand for products in the market (Mears et al., 2007a).

These results suggest the possibility of displacement of crime (Cornish & Clarke, 1987). According to Guerette & Bowers (2009, p. 1333), displacement of crime can be classified based on six categories:

> temporal (offenders change the time at which they commit a crime), spatial (offenders switch from targets in one location to targets in another location), target (offenders change from one type of target to another target type), tactical (offenders alter the methods used to carry out crime), offence (offenders switch from one form of crime to another), and offender (new offenders replace old offenders who have been removed or who have desisted from crime).

The data of this study point to the spatial and target elements of displacement of agricultural theft in the Japanese context. The current results suggest that, specifically, groups of offenders move to other locations since they are blocked from opportunities to commit crime by intensive patrols or other prevention measures implemented where they initially were. Regarding spatial displacement of crime, displacement refers to the increase in crime rates in areas surrounding the intervention zones (i.e., “moves around the corner”) (Frogner et al., 2013, p. 346). However, in the context of agricultural theft in Japan, offenders may relocate to areas more widely since suitable targets change depending on the harvest period.

In addition, unlike residential burglary, some prevention measures are likely to be implemented and initiated not by individuals but the police, municipalities, and JAs, and this may make offenders think they need to relocate to areas far away from their original zones. Therefore, to explore this issue further, future research must investigate offender mobility patterns empirically to examine if the offenders relocate to areas far away from their original zones for theft. Additionally, economic trends, supply and demand should also be considered as a factor affects the target displacement, since as No. 8 said, media reports about price surges can make people think that theft of agricultural produce is acceptable in order to make a living, which can aggravate the problem.

It was revealed that there are different types of thefts happening in different areas. Specifically, some thefts were committed by individuals, and others were by a group of foreigners or organized crime groups that consist of foreigners. For instance, in September 2020 in Saitama Prefecture, a group of Vietnamese was arrested because they stole about 180 pears from the fields (Asahi Shimbun, 2021). These results provide valuable insights for the policing of agricultural crimes. Specifically, the police need to develop different prevention policies since there are possibly different criminal profiles. Additionally, prior research (Barclay & Donnermeyer, 2002, 2011; Mears et al., 2007b) demonstrated the different environmental factors are associated with different types of thefts. In addition, in our interviews, some interviewees said the position of CCTVs needs to be changed depending on the agricultural produce. Therefore, empirical research that adopts environmental criminology is also suggested to understand environmental or contextual factors that affect the risk of agricultural theft.

Another implication of findings related to the images of offenders is that the occurrence of agricultural theft by organized crime groups that consist of foreigners may abet discrimination against foreigners living in Japan. To develop crime and safety methods and policies in the rural regions of Japan, it is essential to pay attention to social environments. As alluded above, rural areas have experienced demographic challenges due to population ageing, and this situation is expected to continue; it seems inevitable to seek not only domestic but also foreign labor support, such as from those working under the Technical Intern Training Program, to realize sustainable agriculture. Rural areas tend to be more exclusive, which may cause conflicts with people from outside, and these conflicts may lower the threshold for crime. Indeed, past literature in the UK reported that neighborhood crime prevention in rural areas can lead to social bias which is sometimes as observed as an issued related to voluntary action (Yarwood & Edwards, 1995). Therefore, social development crime prevention policies that promote mutual understanding among community members may be valuable.

Several participants of this study have cooperated with the local police and government. Since personnel transfer often takes place in the police and local government, it is important to maintain cooperation between these bodies and the JAs, as No. 9 mentioned. In this respect, establishing task forces and holding regular meetings on agricultural theft prevention are helpful to realize and maintain their cooperation and better understand the demands of farmers. Additionally, the current study found that some JA personnel perform intensive patrols with different actors, such as the police, local government, as well as members of the local community. Indeed, as farmers grow older, patrols by farmers themselves are now becoming increasingly difficult. Therefore, a key practical implication from the current study is that cooperation between different actors supporting the communities is essential and must be promoted to realize sustainable patrols and theft prevention interventions.

Further, we found that diverse agricultural theft prevention measures have been implemented. Related to the cooperation with different actors in agricultural theft prevention,

different actors have been involved in patrols in some JAs. Among the interesting findings from the interviews was how participants devised different ways to conduct effective patrols. For instance, Nos. 1, 10, and 11 shared that they referred to the information on victimization collected by farmers and the police on their patrol routes. Additionally, in No. 9, patrols, directed by the police regarding patrol routes, involve local governments, the fire brigade, and the crime prevention association, and these patrols by different actors are performed to fill in the blanks of patrols by each other. It can be said about three participants from Yamanashi Prefecture that since they experienced thefts of fruits two years ago, they have considered how they can implement effective and sustainable ways of patrols.

Further empirical research is recommended to investigate if patrols by these different actors are effective in preventing agricultural thefts by using crime statistics and patrol records data. In addition, it is considered important to examine if such multi-actor patrols work in other areas of Japan. From evidence obtained from the current qualitative study, it is hypothesized that this kind of multi-actor patrols work well only in areas in which cooperative systems in neighborhoods are established, and some areas feel difficult to realize this kind of patrols.

In addition, the current qualitative study found that some cases of agricultural theft occurred in daytime, though intensive patrols are performed late at night. This mean that this approach may not be enough or effective, and it is therefore necessary to revisit how the patrols are established. Therefore, future research should also determine in which period of time patrols should be performed for theft prevention.

Another important finding is that farmers are not equally eager in taking prevention measures. Specifically, some farmers are eager to introduce new prevention measures but others are reluctant to or do not see the need to do so. Future studies on how to accelerate farmers' prevention behaviors are therefore recommended. For instance, based on the techniques of and insights from behavioral economics and psychology, the efficacy of the nudge-based approach to change farmers' prevention behaviors can be tested.

As alluded above, rural areas are now encountering demographic challenges due to population ageing, thus warranting a reconsideration of crime prevention policies, such that they reflect rural residents' situations and experiences (Shimada & Suzuki, 2021). The current study confirms this point in the context of agricultural theft prevention. Specifically, a few participants mentioned that it is dangerous for farmers to patrol by themselves considering their age and that they ask young farmers to help install CCTVs given their unfamiliarity with such technology. It is therefore suggested that local authorities consider how they can contribute to realizing community safety with older people in collaboration with different actors. This point indeed links well to the above-mentioned point of behavioral economics techniques. Specifically, local authorities can use the nudge-based approach to disseminate trusted sources of crime prevention information and guidance to appropriately and effectively protect the communities.

Prior literature on agricultural theft (Barclay, 2003; Bunei et al., 2016; Ceccato, 2015; Donnermeyer, 2017) suggests that the theft reporting rate can vary depending on what items are stolen and farmers' attitudes toward the police. Indeed, similar issues related to reporting to the police were found in the current study. As reported above, farmers preferred not to spend time to report to the police during the harvest season since it could have consequences such as getting involved in crime scene investigation. No. 9 shared that farmers report victimization to the JAs instead of reporting to the police by themselves. Therefore, establishing a system where farmers can report thefts and victimization experiences to the police via the JAs in their respective areas is highly recommended. Additionally, a victimization survey of farmers is considered important to better understand the situation of agricultural theft, as well as farmer reasons for not reporting to the police and what they would like the police to do.

Several participants shared that financial support from the local governments is helpful to introduce security measures for farmers, including installing CCTVs or sensor alarms and security lighting in their fields. The current study revealed that one common security measure taken by participants was the installation of CCTVs; however, since it involves considerable costs to introduce these measures, participants felt that it may be difficult to ask the farmers to implement them. Further studies, which empirically test the effectiveness of CCTVs or sensor alarms and security lighting on crime prevention, will be helpful to inform related local government initiatives and subsidies. This kind of research is helpful particularly in relation to its effectiveness in rural locations that may be isolated from access and/or power sources. Indeed, as No. 9 said, some JAs are skeptical about the effectiveness of CCTVs and they argued that the position of the CCTV needs to be changed depending on seasons. In addition, No.4 argued that their local government regards theft of agricultural produce as the same as shoplifting, and subsidies could not be given only to agriculture without giving them to the shopping district. This kind of reluctant attitudes by the local governments does not encourage home-grown food production that exists. In these senses, too, empirical research on the effectiveness of "hard" measures that can provide its scientific evidence for not only for farmers and but also for local governments is important.

Despite its distinct findings, the current study has some limitations. First, since the interviewees were recruited based on their positive response on a social survey to an item regarding their willingness to cooperate for an interview, they were not nationwide representatives of JAs. Additionally, their motivation for addressing issues related to thefts of agricultural produce and machinery is considered to be high. Therefore, their answers cannot be generalized to the situations of other JAs. Second, the current study is limited by the absence of interviewees who are from JAs in regions with plain rice fields. Specifically, since the social survey through which the interviewees were recruited was about fruit theft victimization, all the interviewees are from areas where the main produce is fruits. Although the interviewees talked about their experiences related to other types of agricultural thefts, these constitute supplementary findings, and further research is necessary to understand the situation of agricultural theft victimization in other parts of Japan. Third, there might be some amount of unreported or undiscovered victimization of agricultural theft; the answers

provided by the participants may not present a full picture of the current situation of agricultural theft happening in their jurisdictions.

Notwithstanding these limitations, the current study contributes to the literature on rural criminology. To the best of our knowledge, this is the first qualitative study to investigate the situation of agricultural theft in Japan. Recommendations for policymaking regarding agricultural theft in Japan are as follows. First, each JA has different issues related to agricultural theft and its prevention. In addition, different items can be targets of thefts depending on the year or season, and poor harvest can increase the risk of theft. Therefore, large-scale empirical research is needed to better understand situations of agricultural theft in each region of Japan. More specifically, a longitudinal study with a greater focus on the relationship between the situation of theft and harvest could produce interesting findings that account more for the impact of harvest on the risk of victimization. In addition, a longitudinal study is also helpful to determine the association between the experience of agricultural theft victimization and prevention behaviors among famers. Indeed, as Mears et al. (2007b) admitted, cross-sectional data are not able to causal inferences. Second, as alluded above, rural municipalities and police departments have limited resources available for crime prevention interventions. Additionally, the ageing of farmers has accelerated the difficulty of performing crime prevention activities in rural communities. Therefore, scientific evidence from empirical research regarding effective crime prevention measures and activities would help to establish sustainable crime prevention activities.

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