2021

AGRICULTURE SURVEY REPORT

NATIONAL STATISTICS BUREAU

2021

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FOREWORD

The 2021 Agriculture Survey of Bhutan report presents the results of the first agriculture survey conducted by the National Statistics Bureau. It contains basic statistics on the profile of the farming population in the country w.r.t the crop area, yield and production. This report contains production statistics at *dzongkhag* level. I hope that the report will be a key source of information for policy makers, planners and international community.

The survey was enumerated in Covid-19 low-risk *dzongkhags* by 175 university graduate students, supervised by the gewog and dzongkhag agriculture officials while gewog agriculture extension officials in high-risk *dzongkhags*, such as Samtse, Sarpang, Samdrup Jongkhar, as well as in a few high-risk *gewogs* in low-risk *dzongkhags* enumerated the survey. Enumeration took place from January 8 to April 20, 2022.

I hope that the information collected, processed, and reported in this report provides opportunities for stronger evidence-based decisions and policy formulation.

I would like to thank RNR Statistics Technical Working Group (RS-TWG) members, officials of the Agricultural Statistics Division (ASD), Gewog Agriculture Extension Supervisors, Dzongkhag Agriculture Officers for their effort and support in collecting the information from the agriculture households and supporting the RNR statistical framework in the country.

Chhime Tshering
(DIRECTOR)
National Statistics Bureau

ACKNOWLEDGEMENT

The National Statistics Bureau (NSB) successfully conducted the first agriculture survey from January 8, 2022 to April 20, 2022 with the financial support of the Royal Government of Bhutan (RGoB). The agriculture survey report provides a wealth of information on agriculture related indicators. Through this report, the NSB consolidates statistics and indicators that can respond to the needs of our data users.

For the preparation and administration of this survey, the NSB collaborated with many agencies of the government. We would like to thank and extend our appreciation for the support and cooperation rendered for the survey by many government agencies and our farming population. These agencies included the Department of Agriculture, the Ministry of Agriculture and Forests, dzongkhag and gewog agriculture extension officials (GAEOs).

NSB would like to convey its gratitude to the agriculture survey team from the National Statistics Bureau, the field supervisors, enumerators, dashboard managers, RNR statistics technical working group (RS-TWG) members and all the agricultural holders in the country for their support and co-operation.

National Statistics Bureau

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GLOSSARY

2021 AS	2021 Agriculture survey
ADAO	Assistant dzongkhag agriculture officer
ASD	Agricultural statistics division
BAFRA	Bhutan agriculture and food regulatory authority
CAPI	Computer assisted personal interviewing
COVID-19	Coronavirus 2019
CSS	Circular systematic sampling
CV	Coefficient of variation
DAMC	Department of agriculture and marketing cooperatives
DAO	Dzongkhag agriculture officer
DoA	Department of agriculture
DoL	Department of livestock
DSO	District statistical officers
F&V	Fruits and vegetables
FAO	Food and agriculture organization
FW	Final weight
GAEOs	Gewog agriculture extension officials
GhG	Greenhouse gas
GPF	The global economy of pulses
GPS	Global positioning system
HQ	Head quarter
LDL	Low density lipoprotein
MoAF	Ministry of agriculture and forests
MoDA	Mobile application data acquisition
MT	Metric ton
NSB	National statistics bureau
PES	Post enumeration survey
PPD	Policy and planning division
PPS	Probability proportional to size
PSU	Primary sampling unit
RGoB	Royal government of Bhutan
RNR	Renewable Natural Resource
RS-TWG	RNR statistical technical working group
SD	Standard deviation
SSU	Secondary sampling unit
STATA	Statistical software package
ToE	Training of enumerator
UA	Urban agriculture
WCA	World programme for the census of agriculture
WHO	World health organization

EXECUTIVE SUMMARY

1. CEREALS

The production of main cereals was 76,487 MT in 2021. This was 25,728 MT less than in 2020. Samtse dzongkhag harvested 7,412 MT, Punakha harvested 6,820 MT and Sarpang harvested 6,746 MT of main cereals in 2021. The three *dzongkhags* accounted for more than one fifth (27 percent) of the total harvested production of main cereals in 2021.

1.1. Paddy

A total of 40,081 MT of irrigated paddy was harvested in 2021. This was 13,280 MT less than in 2020. A total of 427 MT (300 MT less than in 2020) of upland paddy was harvested. Punakha dzongkhag harvested 6,510 MT of irrigated paddy (1,329 MT less than in 2020) while Paro dzongkhag harvested 5,174 MT (2,848 MT less than in 2020) and Wangdue Phodrang harvested 4,470 MT (1,640 MT less than in 2020). Punakha (16 percent), Paro (13 percent) and Wangdue Phodrang (11 percent) dzongkhag accounted for the highest production of irrigated paddy in 2021.

Harvested production of paddy is observed to decrease gradually for many reasons. With the increasing urbanization and rapid socio-economic development, increasing amount of prime paddy wetland are being lost. Furthermore, agricultural holders are taking up more economically viable, less labor and resources intensive crops over paddy cultivation on wetland. The acreage under paddy is also slowly diminishing due to other competing crops such as growing of vegetables and other cash crops on wetland. Furthermore, in terms of paddy growers it has decreased from 28,516 holders in 2020 to 25,336 holders in 2021, an equivalent down 11 percent than in 2020.

1.2. Maize

Maize which is yet another mostly grown cereal crop in the country has harvested 30,939 MT in 2021. This was 10,026 MT less than in 2020. The major maize growing *dzongkhags* – Monggar harvested 4,369 MT (less 1,793 MT than in 2020), Pema Gatshel harvested 4,205 MT (more 768 MT than in 2020) and Trashigang harvested 3,493 MT (less 3,103 MT than in 2020) in 2021. Monggar (14 percent), Pema Gatshel (14 percent) and Trashigang (11 percent) dzongkhag accounted for the highest production of maize in 2021. Maize growers decreased from 43,776 holders in 2020 to 38,397 holders in

2021, an equivalent down 12 percent than in 2020.

1.3. Other cereals

A total of 1,169 MT of wheat and 1,855 MT of buckwheat were harvested. Harvested production of wheat fell to 1,169 MT (less 454 MT than in 2020) while buckwheat fell to 1,855 MT (less 846 MT than in 2020) in 2021.

A total of 857 MT of barley and 1,122 MT of millet was recorded in 2021. The harvested production of barley fell by 266 MT while millet fell by 491 MT than in 2020. There was also reduction in the harvest area of barley (less 159 acres than in 2020) and millet (less 417 acres than in 2020) like any other cereals in 2021.

About 37 MT of quinoa was estimated to harvest in 2021, which was 65 MT less than in 2020. The area under quinoa cultivation reduced to 101 acres (less 172 acres than in 2020) in 2021.

2. OILSEEDS AND PULSES

In 2021, the harvest of main oilseeds and pulses was lower than in 2020, in part reflecting the decline in the harvested area. The overall decline was principally due to lower harvested production levels for mustard (206 MT less than in 2020), groundnut (266 MT less than in 2020), beans dry (165 MT less than in 2020) and rajma beans (487 MT less than in 2020).

3. VEGETABLES

3.1 Cabbage

The total harvest of cabbage was 3,763 MT in 2021. This was 4,066 MT less than the production level in 2020. The overall fall in cabbage production in 2021 was due to the reduction in the harvest area (752 acres less than in 2020) and yield per acre. The yield per acre in 2021 was 2,851 kg, this was 928 kg less than in 2020.

3.2 Cauliflower

Cauliflower also saw sharp decrease in the harvested production from 2,448 MT in 2020 to 1,648 MT in 2021. This was about 800 MT less than in 2020. The overall yield per acre was 1,740 kg in 2021 (less 303 kg per acre than in 2020). Thimphu and Lhuentse dzongkhags saw highest per acre yield drop in 2021. Thimphu dzongkhag harvested 2,223 kg (less 2,476 kg than in 2020) per acre in 2021 while Lhuentse dzongkhag harvested 1,487 kg (less 1,613 kg than in 2020) per acre in 2021.

3.3 Beans

The total harvest of beans was 2,096 MT in 2021. This was 1,073 MT less than the production level in 2020. The overall fall in beans production in 2021 was due to the reduction in the harvest area (933 acreas less than in 2020) rather than the yield per acre. The yield per acre in 2021 was 1,300 kg, this was 55 kg more than in 2020.

3.4 Broccoli

Broccoli also saw decrease in the harvested production from 1,727 MT in 2020 to 1,157 MT in 2021. This was about 570 MT less than in 2020. The overall yield per acre was 1,328 kg in 2021 (less 232 kg per acre than in 2020). Tsirang and Monggar dzongkhags which accounted for the highest production share in 2020 saw drop in the harvested production.

3.5 Chili

Chili is a commercial crop and one of the most important vegetables grown in almost all 20 *dzongkhags* in the country. The total harvest of chili was 5,864 MT in 2021. This was 3,469 MT less than the production level in 2020. The overall fall in 2021 was due to the reduction in the harvest area (326 acreas less than in 2020) and yield per acre. The yield per acre in 2021 was 1,705 kg, this was 774 kg less than in 2020. Most of the chili growing *dzongkhags* like Paro and Punakha harvested lower level of production in 2021 than in 2020. Punakha dzongkhag harvested 413 MT (476 MT less than in 2020) while Paro harvested 999 MT (663 MT less than in 2020) in 2021.

3.6 Onion bulb and tomato (excludes tree tomato)

A total of 419 MT (more 202 MT than in 2020) of onion bulb was harvested in the country. Major onion bulb producing *dzongkhags* also saw sharp increase in the harvested production – Tsirang with 65 MT (up 34 MT than in 2020) and Dagana with 110 MT (up 82 MT than in 2020). Although the yield per acre remained constant (1,067 kg in 2020 and 1,008 kg in 2021) for onion bulb, the harvested area increased more than double from 203 acres in 2020 to 415 acres in 2021.

Harvest of tomato, on the other hand was 289 MT in 2021. This was 69 MT less and 17 acres less in terms of harvest area than in 2020. Samtse (up 6 MT than in 2020) and Dagana (up 18 MT than in 2020) dzongkhags received positive growth in the harvested production in 2021 while for many other *dzongkhags*, the growth was otherwise.

3.7 Asparagus, carrot and radish

A total of 178 MT (more 51 MT than in 2020) of asparagus, 874 MT (less 914 MT than in 2020) of carrot and 2,576 MT (less 2,658 MT than in 2020) of radish in 2021. Asparagus harvest for many *dzongkhags* have improved over the years with the increase in the national yield per acre from 614 MT in 2020 to 983 MT in 2021. Paro and Thimphu accounted more than three-fourth of the total asparagus production in 2021.

4. SPICES

4.1 Cardamom

Among major spices grown in the country, cardamom and ginger are mostly grown as export commodities. About 1,609 MT of cardamom were

harvested from 11,599 acres in 2021. This was 566 MT less than in 2020. Climate change has been significantly impacting the traditional management practices of cardamom farming. The harvested production of cardamom has become uncertain due to persistent pests and diseases. The yield per acre was recorded at 140 kg in 2021, less 20 kg than in 2020. Major cardamom growing *dzongkhags* – Samtse (less 253 MT than in 2020), Tsirang (less 130 MT than in 2020), Dagana (less 23 MT than in 2020) and Chhukha (less 75 MT than in 2020) recorded lower levels of production in 2021.

4.2 Ginger

Harvest of ginger was 7,154 MT in 2021. This was 1,736 MT less than in 2020. A similar observation was noted for ginger farming in terms of the production levels for major producing *dzongkhags*. Samdrup Jongkhar harvested 2,189 MT (less 340 MT than in 2020), Samtse 1,364 MT (less 296 MT than in 2020) and Chhukha 1,422 MT (less 819 MT than in 2020) in 2021. The national ginger yield per acre declined from 2,389 kg in 2020 to 2,323 kg in 2021. About 641 acres reduction in the harvested area was observed in 2021 compared to previous year.

4.3 Sichuan pepper

The 2021 Agriculture survey collected information on the production of Sichuan pepper for the first time during the reference year. The harvested production here refers to domesticated Sichuan pepper and do not include those collected as NWFP from the forests. Sale of Sichuan pepper or thingye fetches good price to farmers. The number of thingye growers have increased recently in many *dzongkhags*. The harvested production of Sichuan pepper was a little more than 30 MT in 2021. Monggar harvested 6 MT while Trongsa and Trashi Yangtse, respectively harvested 5 MT each.

5. ROOTS AND TUBERS

5.1 Potato

Among the roots and tuber, potato has been one of the highest cash crops exported to India and this generates a lot of revenue to the farming population. The country harvested 38,573 MT of potatoes in 2021, which was 6,928 MT less than in 2020 (a decrease of 15 percent). Most of the major potato producing *dzongkhags* had lower harvests in 2021 – Wangdue Phodrang harvested 10,815 MT (2,734 MT less than in 2020); Paro harvested 4,370 MT (1,038 MT less than in 2020); and Monggar harvested 3,752 MT (501 MT more than in 2020).

5.2 Cassava

About 389 MT of cassava was harvested in 2021. This was 219 MT less than in 2020. The per acre yield of cassava was recorded at 1,820 kg in 2021, less 80 kg

than in 2020. Major cassava producing *dzongkhags* – Chhukha (less 52 MT than in 2020) and Samtse (less 93 MT than in 2020) reported lower level of harvested production in 2021.

5.3 Other roots and tuber

The harvest of other roots and tuber included 53 MT of sweet potato (down 14 MT than in 2020), 147 MT of taro (down 97 MT than in 2020) and 146 MT of ground apple (down 90 MT than in 2020). Lower levels of harvested production were recorded due to significant reduction in the harvested area.

6. FRUITS

6.1 Apple

About 2,324 MT of apple were harvested in 2021. This was 1,732 MT less than in 2020. The per bearing tree yield of apple was recorded at 17 kg in 2021, less 4 kg than in 2020. Major apple producing *dzongkhags* – Paro harvested 1,511 MT (less 1,279 MT than in 2020) and Thimphu harvested 577 MT (less 190 MT than in 2020). In terms of the yield per bearing tree, Paro recorded at 17 kg (less 5 kg than in 2020) and Thimphu at 20 kg (less 2 kg than in 2020). The lower level of apple production in 2021 was due to reduction in bearing trees to 134,004 (less 57,613 trees than in 2020).

6.2 Areca nut

About 21,377 MT of areca nut were harvested in 2021. This was 3,931 MT more, equivalent 23 percent more than in 2020. The per bearing tree yield of areca nut was recorded at 12 kg in 2021, more 1 kg than in 2020. Major areca nut producing *dzongkhags* – Samtse harvested 11,393 MT (more 3,902 MT than in 2020), Sarpang harvested 6,350 MT (more 630 MT than in 2020) and Samdrup Jongkhar harvested 1,605 MT (less 257 MT than in 2020) in 2021.

6.3 Mandarin

About 15,966 MT of mandarin were harvested in 2021. This was 9,694 MT less than in 2020. The per bearing tree yield of mandarin was recorded at 20 kg in 2021, less 10 kg than in 2020. Major mandarin producing *dzongkhags* – Dagana harvested 2,792 MT (less 1,014 MT than in 2020), Samdrup Jongkhar harvested 2,378 MT (less 926 MT than in 2020) and Tsirang harvested 2,148 MT (less 1,331 MT than in 2020) in 2021.

6.4 Watermelon

About 156 MT of watermelon were harvested in 2021. This was 103 MT more than in 2020. The per acre yield of watermelon was recorded at 2,613 kg in 2021, more 1,105 kg than in 2020. Major watermelon producing *dzongkhags* – Zhemgang harvested 55 MT (more 35 MT than in 2020), Samtse harvested 51 MT, Trashigang harvested 21 MT (more 19 MT than in 2020), Tsirang harvested

7 MT (less 3 MT than in 2020) and Monggar harvested 7 MT (more 6 MT than in 2020) in 2021. About 67 acres of area was estimated under watermelon cultivation. This was 30 acres more than in 2020.

6.5 Dragon fruit

About 1 MT of dragon fruit were harvested in 2021. This was marginal increase in the harvested production in 2021 than in 2020. The per bearing tree yield of dragon fruit was recorded at 3 kg in 2021, equivalent than in 2020. Only 105 bearing trees were reported to increase in 2021. Not many *dzongkhags* reported to grow dragon fruits in 2021. Of those reported *dzongkhags*, Monggar and Tsirang accounted for the larger share of dragon fruit harvest in 2021.

6.6 Kiwi

Country recorded 51 MT of kiwi production in 2021. This was 22 MT more than in 2020. An estimated 4,084 bearing kiwi trees (up 1,016 bearing trees than in 2020) existed in 16 *dzongkhags* in 2021. The per bearing tree yield was recorded at 12 kg in 2021 (more 3 kg than in 2020). Chhukha dzongkhag reported more than three-fourth of the total kiwi production in 2021.

Chapter 1
INTRODUCTION

1.1 BACKGROUND

The agricultural statistics have become an important tool for taking stock and giving opportunities to pursue the main national objectives such as tackling rural poverty, promoting sustainable agricultural development, and many other aspects of inclusive food systems. This publication presents, at a glance, key indicators on agriculture and food production in the country such as a comprehensive information on area, production and yield of principal crops viz: cereals, oilseeds and legumes, vegetables, fruit crops, roots & tubers and other permanent crops cultivated in Bhutan.

The 2021 Agriculture Survey (2021 AS) enumerated 19,402 households, approximately 29% of the total 66,587 agricultural households in the country. The survey collected data on the crop production chiefly focusing among many other on cereals, oilseeds and legumes, vegetables, fruits, roots and tubers, and permanent crops. Additional information on harvest area loss and sale of crop of the total produced during the reference year were also collected.

This report presents key findings from the survey, which are expected to be useful to the Government and other development partners to assess achievements in the RNR Sector and further help in formulating plans and policies based on the data.

1.2 SURVEY REFERENCE PERIOD

The 2021 AS was conducted from January 8, 2022 to April 20, 2022. January to December, 2021 was the reference year for the survey. This means that the 2021 AS provides production and area data as for 2021.

1.3 OBJECTIVES OF THE SURVEY

To gauge the data gap of the country for having a reliable data for assisting the planning and developmental activities of RNR sector, the role of the annual agriculture survey is of much value, as it provides the profile of agriculture households in the country. The following are specific objectives of the 2021 AS:

- To generate and meet the data requirements of the RNR sector in the country for the preparation of plans, programs and to assess the achievements;

- To establish reliable information on crop production and land use for planning and monitoring of agriculture development programmes;
- To collect information on indicators like annual crop production, yield and agricultural engaged area, fruit crop production and trees estimates, etc;
- Prepare time series data of land use and agriculture production trend; and
- To provide baseline data on RNR Sector on time and to strengthen the statistical system of the country by way of provisioning efficient use of the existing facilities, capacity building on human resources, infrastructure, technological innovations, etc.

1.4 SCOPE AND COVERAGE

The World Programme for the Census of Agriculture 2020 (WCA 2020) provides a comprehensive practical guidance to census and survey practitioners on the main stages involved in the preparation and implementation of the census of agriculture. The Food and Agriculture Organization (FAO) of the United Nations recommends all countries to collect information on many dimensions of food and agriculture – from the characteristics of the sector of production, prices and trade, as well as food security and nutrition and environmental aspects.

The 2021 Agriculture survey (2021 AS) covered agricultural holdings in rural areas to gather key information on crop productions and harvest areas of different crops that are required to formulate policy decisions and monitor progress towards sustainable Renewable Natural Resources (RNR) sector in the country. Holdings in the non-household sector such as that of agriculture groups or cooperatives, monasteries, government insitutions (schools, research centres, etc) and others like labour camp holdings and armed force premises holdings were not captured as these are not as significant as the household sector.

Furthermore, while the role of urban agriculture (UA) is increasing in the food systems particularly due to its ability for poverty alleviation and food security in urban areas, the 2021 AS did not cover UA. The recent COVID-19 pandemic disrupted the supply food chain from rural to urban areas and therefore some holders in urban particularly in the capital city like Thimphu saw increase in the number of households cultivating vegetables. However, this is a recent phenomena and it is not captured in the 2021 AS.

1.5 ORGANIZATION OF THE REPORT

The publication is organized in seven chapters. The introductory chapter one provides the general context of conducting the agriculture survey, including the objectives of the survey and its scope and coverage.

Chapter two describes the survey methodological modalities implemented in the survey, to offer readers and data users a better understanding of how the survey results have been obtained and how they should be interpreted. The chapter also describes other aspects of survey operations such as stakeholder participation, the design of the questionnaire, data collection and capture, pre-survey listing operations, training of enumerators and supervisors, survey enumeration, data processing, including data compilation, consolidation, validation and editing, tabulation, analysis, followed by report writing.

Chapter three to seven cover the subject matter of the survey. For example, chapter 3 presents the statistics on cereal, chapter 4 on oilseed and legume, chapter 5 on vegetable and spices, chapter 6 on roots and tuber and finally chapter 7 on fruits. The report concludes with detailed annex statistical tables and the survey questionnaire.

Chapter 2
Survey methods and modalities

2.1 SURVEY PLANNING AND BUDGETING

Like any other survey, the 2021 Agriculture Survey of Bhutan (2021 AS) followed standard survey methodologies and operations to assure the quality of data.

The initial preparation of the survey included drafting a budget proposal in early August, 2021 and it was submitted to the Prime Minister's Office-PMO to seek funding. Following an assessment of the proposal, it was endorsed by PMO in September, 2021.

Pre-survey activities started from early November 2021 and the main survey was conducted from 8th January, 2022 to 20th April, 2022, with financial support from the Royal Government of Bhutan (RGoB) and technical support from the renewable natural resources (RNR) statsitics technical working group (RS-TWG). The RS-TWG included officials from the Department of Agriculture (DoA), the Department of Livestock (DoL), the Department of Agricultural Marketing and Cooperatives (DAMC), Policy and Planning Division (PPD) and the Bhutan Agriculture and Food Regulatory Authority (BAFRA) of the Ministry of Agriculture and Forests (MoAF), and the National Statistics Bureau.

2.2 STAKEHOLDER ENGAGEMENT

To ensure proper coordination and planning, the NSB, with support of the RS-TWG, convened several rounds of workshops to finalize the questionnaire and survey operational plan. Two major stakeholder workshops were conducted at various stages of the survey preparatory phase. To seek the support and cooperation of MoAF and agree on survey administration and implementation strategies, as well as on the information to be produced by the survey, the survey operational plan, presented in Figure 2.01, was adopted in view of the COVID-19 pandemic.

For low-risk COVID-19 *dzongkhags*, the agriculture sector in the respective *dzongkhags* supported the NSB with recruitment of university graduates as temporary enumerators for field data collection. The sector also procured transportation for the survey field operations, in close collaboration with respective District Statistical Officers (DSOs). Gewog Agriculture

Extension Officials supported field survey supervision and other logistical arrangements for enumerators, such as identification of agriculture households, deployment of enumerators, and enumerator lodging and daily allowances.

For high-risk *dzongkhags*, similar arrangement could not be adopted due to COVID-19 related travel restrictions. Furthermore, the recruitment of graduates as temporary enumerators and the provision of training of enumerators by the NSB was found to be challenging. However, a team from NSB visited high-risk dzongkhags and Gewog Agriculture Extension Officials were provided training on the installation of software to enable computer assisted personal interviewing (CAPI), how to use the digitized questionnaire, and procedures for implementing data collection in the field. Officials from the *dzongkhag* agriculture sector supervised the field data collection.

2.3 QUESTIONNAIRE AND MANUALS

The 2021 AS was conducted by NSB for the first time, with the survey questionnaire thoroughly reviewed by members of the RS-TWG. Previous agriculture surveys were conducted by the Ministry of Agriculture and Forests. The main survey questionnaire (see Annex) was drafted based on recommendations and feedback from stakeholder workshops, and contained the following modules:

- **Module A. Identification.** This module had basic information about the name and location of the agricultural holders, as well as other demographic information of the holding.
- **Module B. Cereal.** This module collected information about the type of cereals grown, including information on sown area, area loss and harvested production during the reference year. The major cereals grown are irrigated paddy, upland paddy, maize, wheat, barley, millet, buckwheat and quinoa.
- **Module C. Oilseeds.** This module focused on oilseeds grown by the holders such as mustard, sunflower, soybean, groundnut and perilla.
- **Module D. Pulses.** This module collected information about the major pulses such as rajma beans, mung beans, lentil and beans dry.
- **Module E. Vegetables.** This module collected information of 20 different vegetables grown during the reference year.
- **Module F. Spices.** The module focused on major spices grown and these included cardamom, ginger, turmeric, garlic bulb, coriander and Sichuan pepper.
- **Module G. Roots and tubers.** The major roots and tubers grown in the country are potato, sweet potato, cassava, taro and ground apple. The module focused on these major roots and tubers.

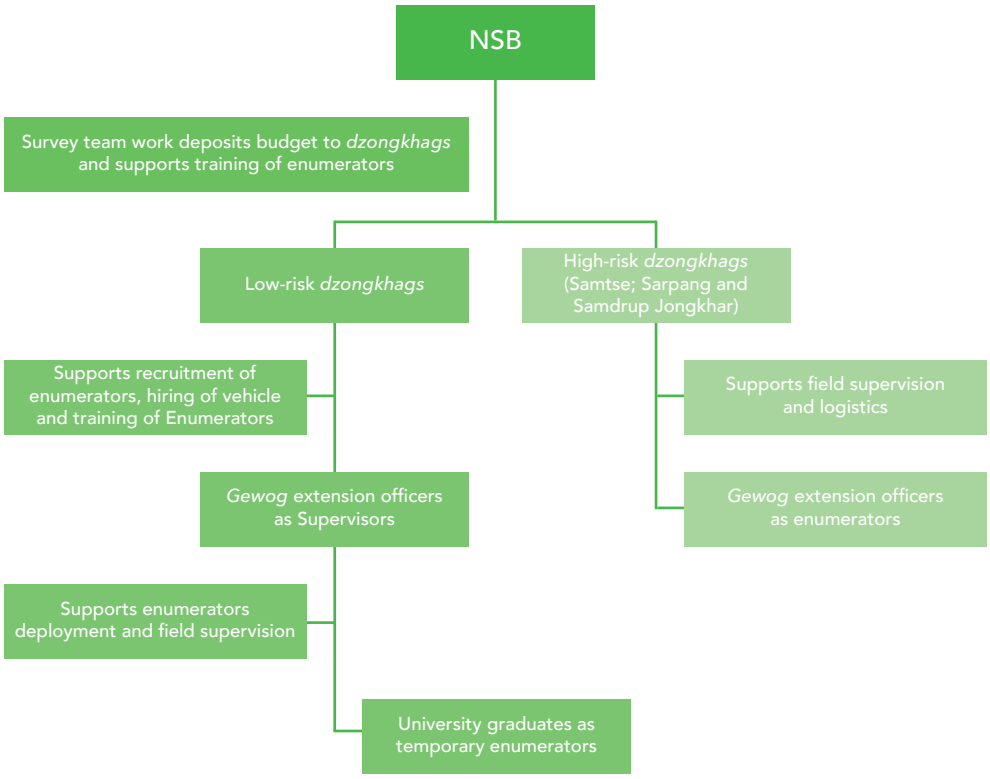

Figure 2.01 Survey operational plan

- Module H. Fruits. This module collected information of 26 different fruits grown in the country. The information collected through this module included the total number of trees, bearing trees and the harvested production during the reference year.

In all the modules, additional information on the sale of agricultural crops from the farm (home) and the farmgate prices were collected. The final survey questionnaire was agreed and finalized through the RS-TWG workshops for implementation using computer assisted personal interviewing (CAPI). Following the finalization of the questionnaires, field instructions or manuals were developed to guide the enumerators and were incorporated in the CAPI, or digitized questionnaire. The CAPI questionnaire was tested several times in survey pilot and revised based on the evaluation of the pilot.

2.4 PREPARATION OF FRAMES

The listing was conducted in August 2021 with support from the Department of Agriculture, Ministry of Agriculture and Forests. Gewog Agriculture Extension

Officials from 205 *gewogs* updated the list of agriculture households residing in their respective *gewogs* in the Mobile Application Data Acquisition (MoDA) of the WFP, and the updated list, was shared to NSB by the Policy and Planning Division (PPD), MoAF. The updated list frame received from Gewog Agriculture Extension Officials were checked and corrected for inconsistencies to enable enumerators to locate households during the survey. For some *gewogs*, updated households were received by NSB in emails in xls format for quick validation.

2.5 SAMPLING DESIGN

Undertaking a survey is a complex and resource intensive. It entails extensive preparation and planning both in terms of human capacity and financial resources. The sample for the 2021 AS was designed to provide estimates for a larger number of agriculture households. A stratified uni-stage sampling design was employed and a Circular Systematic Sampling (CSS) approach was used to select the participating households from the *gewogs*. All the 20 *dzongkhag*s and 205 *gewogs* were sampled.

2.6 SAMPLE SIZE DETERMINATION

Given difficult geographical distribution of crops in Bhutan based on the different ecological and climatic zones, it is not feasible to produce precise survey results for all crops in each *gewog* or sub district level. This is because agriculture has many indicators to be estimated such as annual crop production, yield, and agriculture crop area and fruit trees, etc. Thus, there is a challenge to come up with a reasonable sample size, which could give precise unbiased efficient estimates. Further, the farmers in Bhutan practice conventional mix farming system with small land holdings and this further makes it difficult for the efficient and unbiased sample size determination.

The 2021 AS adopted the earlier approach of determining the sample size based on the agriculture utilized areas of farming households at *Gewog* (sub district) level as an indicator for sample size calculation. The survey domain is the *dzongkhag*. The *chiwog* as the primary sampling unit (PSU) is selected using the probability proportional to size (PPS) scheme. The farming household which serves as the secondary sampling unit (SSU) is selected systematically.

The initial sample size was calculated as:

$$n_0 = \left(\frac{z * 100 * CV_{area}}{p} \right)^2$$

Where

n_0 = initial sample size;

z = statistics that defines the level of confidence desired.At 95 Confidence interval, the value of z =1.96

CV = co-efficient of variation,where $CV = \frac{SD}{\bar{x}}$

p = value of population proportion or margin of error which is set at 0.15 at *gewog* level.

The final sample size was then calculated by using the population correction factor:

$$n = \frac{n_0}{\left(1 + \frac{n_0}{N}\right)}$$

Where

N is the total farming population in the country.

2.7 SAMPLE ALLOCATION

A total of 20,538 households were allocated to 20 *dzongkhags*. Table 2.01 shows the breakup of sample sizes by *dzongkhags*.

Table 2.01 Sample size allocation by *dzongkhag*

Dzongkhag	Total *Gewog*	Total HHs	Sample HHs
Bumthang	4	1,440	429
Chhukha	11	4,139	1,100
Dagana	14	4,206	1,382
Gasa	4	596	283
Haa	6	1,435	567
Lhuentse	8	1,988	751
Monggar	17	5,149	1,728
Paro	10	3,248	1,018
Pema Gatshel	11	3,438	1,107
Punakha	11	2,563	1,010
Samdrup Jongkhar	11	3,913	1,129
Samtse	15	8,969	1,824
Sarpang	12	4,822	1,292
Thimphu	8	1,404	561
Trashigang	15	5,904	1,662
Trashi Yangtse	8	2,467	818
Trongsa	5	1,554	514
Tsirang	12	3,631	1,232
Wangdue Phodrang	15	3,349	1,338
Zhemgang	8	2,269	793
Total	205	66,484	20,538

2.8 ADJUSTMENT OF WEIGHTS

To adjust for the loss of representativeness caused by non-responding households, the weight of the responding units (W_t_E_h) was increased by deploying the inverse of the percentage responding units from the sample. The non-response weight was calculated as follows:

$$\textit{Non-response weight}\ (W_{nr}) = \frac{1}{(S_h/E_h)} = \frac{E_h}{S_h}$$

Where

S_h=Sample households in the *Gewog*;and

E_h=Enumerated households in the *Gewog*.

The design weight or base weight is the inverse of probability of selection of the sample. Based on the Circular Systematic Sampling (CSS) design, the probability of selection for the sample households in a *gewog* was calculated as follows:

$$\textit{Design weight}\ (W_d) = k = \frac{N_h}{S_h}$$

Where

N_h=total households in the *Gewog*;and

S_h=sample households in the *Gewog*.

Thus, the final weight is given by:

$$\textit{Final weight}\ (FW) = W_d * W_{nr}$$

i.e

$$\textit{Final weight}\ (FW) = \textit{Design weight} * \textit{Non - response weight}$$

Finally, the estimation for observed values in the *Gewog*s has been obtained

by multiplying each sample data with the final weight **(FW)** calculated for each *Gewog*.

Therefore, the estimate of a total value (such as total production) is the product of the final weight **(FW)** and the value (y_i), for each responding unit, summed over all responding units as:

$$Y = \sum_{i=1}^{n} FW * Y_i$$

2.9 USE OF TECHNOLOGY FOR DATA CAPTURE

The World Bank's (WB) Survey Solutions was used to digitize the questionnaire, enter and capture data from respondents. Survey Solutions is a free software package developed by the WB to assist governments, national statistics offices, and NGOs in implementing advanced surveys using mobile devices. The software and digitized questionnaires were loaded into tablets to guide the enumerators through the questionnaire and data collection. This method of digitized data collection and capture is called computer assisted personal interviewing (CAPI).

A number of consistency and data validation checks were incorporated in the digitized data collection, such as automatic skip patterns. Automatic skip patterns ensure that when specific questions need to be skipped - depending on answers to previous questions - the program automatically guides the enumerator to the next question.

The large number of validation checks incorporated into the digitized questionnaire also helped improve data quality, by limiting or avoiding errors in data entry or incorrect answers. Furthermore, specific instructions were provided for each question to help enumerators and respondents in dealing with that question. After the data collection was completed, the data were exported from survey solutions to STATA for analysis.

2.10 PRE-TEST SURVEY

A pilot survey was conducted to check the structure and flow of the questionnaire and to estimate the average time required to enumerate a household. A pilot is important to test the procedures related to enumeration and to improve supervisor training and data processing.

Officials from the Agricultural Statistics Division (ASD) of the NSB conducted the in-house pilot survey over a period of two weeks. The findings from the pilot survey were used to make necessary corrections and improve the structure and flow of the survey questionnaire. The pilot also helped to plan field operations and establish the number of supervisors and enumerators to be recruited to complete field enumeration in the allocated time.

2.11 TRAINING OF SURVEY TEAM

For the main survey, *gewog* supervisors and 175 university graduates were

deployed as enumerators in low risk areas. Based on the pilot survey, an enumerator was estimated to complete data collection for, or enumerate, 6 households per day. The number of enumerators required in *dzongkhags* were estimated based on the sample household list and estimated enumerations per day.

Gewog Agriculture Extension Officials were identified as the supervisors, and a pool of university graduates were selected as temporary enumerators from respective *dzongkhags*. A total of 10 NSB officials were selected as Master Trainers for the Training of Enumerators (ToE) and 17 NSB officials assigned as Dashboard Managers. The recruitments of enumerators were conducted by officials in the respective *dzongkhag* agriculture sector in close collaboration with the District Statistical Officers (DSOs).

The trainings for enumerators were conducted for three days for each *dzongkhag*, from January 4 to 18, 2022. However, due to frequent Covid-19 lockdowns the training for some *dzongkhags* were kept on hold and rescheduled in March, 2022. During the training, enumerators were introduced to the general background of the survey and the concepts and definitions of the terms contained in the questionnaire. They were also trained in the various enumeration procedures and in recording responses to the questionnaire electronically in their android device. During the training sessions, mock interviews in different dialects were conducted to equip enumerators with interviewing techniques.

2.12 FIELD ENUMERATION

The main survey was conducted from 8th January to 20th April 2022. This was a little more than three months due to the pandemic and movement restrictions in *gewogs* for field data collection.

For low-risk dzongkhags, the Gewog Agriculture Extension Officials supervised the field enumeration by developing the enumerators' deployment plan. The enumerators assigned to specific *gewog* executed the field enumeration.

Furthermore, Dzongkhag Agriculture Officials (DAOs/ADAOs) supervised their respective Gewog Agriculture Extension Officials and enumerators to complete the survey despite the pandemic that affected the data collection. Apart from the Gewog/Dzongkhag supervisors supervising the fieldwork of the enumerators, there were 17 dashboard managers at NSB headquarters (HQ), who assigned questionnaires to the field teams and checked the quality of the results. The dashboard managers were also tasked to validate the data received from the field.

2.13 DATA PROCESSING, VALIDATION AND EDITING

After the completion of field enumeration, the data collected from the household were extracted from

Survey Solutions. The raw data set was then exported in STATA format and stored for further cleaning and data validation.

During data collection, the dashboard managers helped assign questionnaires to enumerators in the field, and verified the quality and consistency of each completed questionnaire.

The respective *dzongkhag* dashboard manager assigned questionnaires, reviewed and validated the submitted questionnaires. Missing, incomplete, and inconsistent responses were also verified, and the associated questionnaire was rejected as soon as it was received from an enumerator. Enumerators verified a rejected questionnaire, corrected errors and missing data by calling the associated household, and re-submitted the questionnaire after correction. This iteration process was repeated several times, if required, until the data were corrected. The data were then verified in two additional stages, first by the dashboard managers and then at the NSB HQ.

2.14 POST-ENUMERATION SURVEY (PES)

Any survey or a census is a large and complex operation and non-sampling errors, chiefly the coverage and content errors, when data are collected and processed, are unavoidable. Non-sampling errors generally arise for many reasons at different phases of survey or census preparatory activities, data collection, data processing and data tabulation. According to World Programme for the Census of Agriculture (WCA, 2020), it should be good practice in agricultural censuses to evaluate the accuracy of data collected so census organizers are aware of its quality and users are aware of data limitations. The Post-Enumeration Survey (PES) is a complete and independent renumeration (on a few key variables) of a representative sample of census holdings followed by matching each holding enumerated in the PES with information from the census enumeration.

After the 2021 AS data collection was completed, the consolidated dataset was thoroughly checked to identify any remaining missing values, errors, and inconsistencies. Renumeration of some samples were conducted to check the accuracy of data collected in the 2021 AS. For example, a multi-stage data validation was conducted to ensure the quality of data and give data users the needed confidence. Table 2.02 shows the number of samples validated through call in the first PES stage for priority *dzongkhags*. Those observations that were outside $\mu \pm 2SD$ on the key variables (such as yield per acre and yield per bearing tree) were revalidated by calling the households. 656 households were called and revalidated on the key variables like sown area, area loss, total fruit trees, bearing trees and production.

GIS and remote-sensing techniques

Table 2.02 Number of samples taken for PES study (first-stage)

Type	Crop name	*Dzongkhag*/*Gewog*	No. of households Called
Cereals	Paddy	Paro/Samtse/Lhuentse	31
	Maize	Trashigang/Monggar/Dagana	282
Fruits	Mandarin	Pema Gatshel/Sarpang/Samdrup Jongkhar	83
	Areca nut	Lhuentse/Trongsa	83
	Apple	Thimphu/Paro	16
Roots & tubers	Potato	Wangdue Phodrang/Paro/Trashigang	47
Spices	Cardamom	Samtse/Tsirang/Chhukha	24
	Ginger	Chhukha/Samtse/Samdrup Jongkhar	90
Total			656

are often used to complement the traditional survey and census data. NSB using the GIS and remote-sensing technique validated the data collected in the 2021 AS. For example, 33 samples (see Table 2.03), all paddy growing households from Paro and Punakha dzongkhags were renumerated to check for the difference in the sown or planted area reported in the 2021 AS and the same area reported by holders were measured by the GPS equipment for accuracy.

Sown area reported by the holders during the last 2021 AS and the sown area estimated by GPS-measure were analyzed for the difference in the area. The results (see Table 2.04) indicated that the mean area (survey-1.53 acres; GPS-1.65 acres) difference was not significant (p-value=0.6440) at 5% level of significance.

Furthermore, in the second stage of PES a total of 3,740 households (about 17 percent of the total enumerated sample) covering 9 different major crops in 20 *dzongkhags* were also randomly selected and reenumerated through

Table 2.03 Number of samples taken for the GIS-study

Dzongkhag/Gewog	Sample HHs
Paro	16
Dopshari	5
Loog-nyi	4
Sharpa	4
Wangchang	3
Punakha	17
Dzomi	3
Guma	3
Kabisa	5
Shelnga-Bjemi	3
Toedwang	3
Total	33

Table 2.04 Statistical results of the GIS-study

Statistics	Survey	GPS
Mean	1.529	1.645
Variance	0.783	1.288
Observations	33	33
Hypothesized Mean Difference	0	
df	60	
t Stat	-0.465	
P(T<=t) one-tail	0.322	
t Critical one-tail	1.671	
P(T<=t) two-tail	0.644	
t Critical two-tail	2.000	

Table 2.05 Number of samples taken for PES study (second-stage)

Crop Type	Sample HHs	Total HHs called
Irrigated paddy	500	455
Maize	400	400
Potato	400	323
Chili	440	440
Cardamom	400	357
Ginger	400	319
Apple	400	308
Areca nut	400	353
Mandarin	400	381
Total	3,740	3,336

telephonic calls to collect information on key variables on sown area, area loss, total fruit trees, bearing trees and production. Table 2.05 shows the number of PES samples taken in the second stage.

The results further indicated that there was drop in the majority of selected crops, supporting the survey results of the 2021 AS. The final data set was then made ready for tabulation, analysis and report writing after several rounds of cleaning and validation.

2.15 DATA TABULATION AND REPORT PREPARATION

A tabulation plan and report outline were developed during the survey preparation phase. A core set of basic tables was produced in accordance with the tabulation plan. This was used as the basis for the presentation and analysis of results in the survey report.

The 2021AS report writing team was formed internally to draft the respective sections and chapters of the report. The analysis results and report chapters underwent several rounds of internal review.

2.16 DATA QUALITY ASSURANCE

The quality of data is of primary importance for accuracy, relevance, reliability and validity of results. The survey team implemented measures to support good practices in data collection and to minimize errors in the data collection.

Data quality was enhanced through a variety of measures, from careful attention and stakeholder participation in questionnaire design, to fine tuning the questionnaire, to ensuring the content obtained the most relevant information for key users, such as the Department of Agriculture, Ministry of Agriculture and Forests. In data collection, enumerators played an important role in obtaining accurate and quality information from respondents. Thus, training of enumerators (ToE) was conducted for 3-days to provide a thorough understanding of the concepts, definitions, logical reasons for and objectives of the questions to be asked of respondents.

Furthermore, the survey team from NSB validated the data collected by supervising enumerators during the CAPI data collection and at the field enumeration level. Some of the validation and consistency checks put in the CAPI-questionnaire also helped to

identify or prevent errors in responses and data entries, which helped clean the data during field enumeration.

In the next stage, the completed household questionnaires were also checked thoroughly at HQ. The HQ survey team validated the data by examining the distribution of variables on the crop area and production after the completion of the survey, and performed internal and external validations. Where necessary, the survey team randomly called agriculture households with questionnaires that needed further data validation.

2.17 RESPONSE RATE

The problem of non-response is always expected in any survey. For 2021 AS, the response rate was 94 percent. The overall non-respone rate was close to 6 percent. The non-response was observed in many *dzongkhags* due to the pandemic and other reasons. Table 2.06 gives the response rate by different *dzongkhag*. In many *dzongkhags*, the response rate was close to cent percent. The least response rate was observed in Trashigang, Haa and Monggar dzongkhags.

Table 2.06 Response rate by *dzongkhag*

Dzongkhag	Sample HHs	Enumerated HHs	Response Rate (%)
Bumthang	429	414	97
Chhukha	1,100	1,095	100
Dagana	1,382	1,312	95
Gasa	283	277	98
Haa	567	484	85
Lhuentse	751	714	95
Monggar	1,728	1,499	87
Paro	1,018	939	92
Pema Gatshel	1,107	981	89
Punakha	1,010	982	97
Samdrup Jongkhar	1,129	1,120	99
Samtse	1,824	1,817	100
Sarpang	1,292	1,291	100
Thimphu	561	557	99
Trashigang	1,662	1,415	85
Trashi Yangtse	818	747	91
Trongsa	514	490	95
Tsirang	1,232	1,164	94
Wangdue Phodrang	1,338	1,330	99
Zhemgang	793	774	98
Bhutan	**20,538**	**19,402**	**94**

Chapter 3
CEREALS

3.1 INTRODUCTION

Self-sufficiency in cereals are identified as the thrust area for the agriculture sector in the country. For example, rice is the main staple food in the country and attaining the rice self-sufficiency has always been given the top most priority in the agricultural policy agenda.

Following the World Programme for the Census of Agriculture 2020 (WCA 2020) of the Food and Agriculture Organization (FAO) of the United Nations, the 2021 Agriculture survey was conducted covering different aspects of the cereal crops. FAO includes wheat, rice paddy, barley, maize, popcorn, rye, oats, millets, sorghum, buckwheat, quinoa, fonio, triticale, canary seed, mixed grain and cereals nes as cereals. For the case of Bhutan, the core cereal crops grown by small agricultural holders are paddy, maize, wheat, barley, buckwheat, millet and quinoa. The focus of the current chapter is on crop production including area under cultivation for these major cereal crops and the discussion of the results is limited to presenting the crop production and area at the *dzongkhag* level.

Crop production is particulary sensitive to prevailing weather and climatic conditions during the key times of the growing season. For example, most Bhutanese farmers report crop damage during the stage of plant's development due to heavy rain fall, strong winds or in some cases due to summer droughts and heat waves causing significant yield losses. Although, sound and timely crop production statistics are key to inform decisions, policies and investements that help tackle issues related to food and agriculture, generating precise crop production statistics still remain as challenge. It is for this reason that crop production is sensitive to weather conditions throughout the growing season and at harvest.

The crop production of all cereal crops presented here in this chapter were as reported by the small-scale agriculture holders during the 2021 Agriculture survey except for paddy and maize. The production of paddy and maize were computed by multiplying the harvest area of the holding as reported in the survey with the crop cut yield of the respective *gewogs* (i.e. area harvested by the households [as reported based on the sown area minus the crop area lost] * crop cut yield of the *gewog*) received

Table 3.01 Cereals harvested by type, 2021

Type	Sown Area (Acre)	Harvest Area (Acre)	Production (MT)
Paddy (irrigated)	25,984.87	23,463.41	40,080.82
Paddy (upland)	713.71	591.68	427.08
Maize	25,473.41	20,289.34	30,938.64
Wheat	2,609.99	2,286.09	1,168.94
Barley	1,803.94	1,604.84	857.21
Millet	2,513.76	2,273.04	1,122.11
Buckwheat	4,401.32	3,781.56	1,855.32
Quinoa	101.26	88.56	37.06

from the Ministry of Agriculture and Forests. Production, other than paddy and maize reported here refers to the actual harvested production from the field during the survey reference period. All the production data are presented in tonnes (MT) while area are in acres.

3.2 PRODUCTION OF MAIN CEREALS

The production of main cereals was 76,487 MT in 2021. This was 25,728 MT less than in 2020, which is 25 percent decline. Samtse dzongkhag harvested 7,412 MT, Punakha harvested 6,820 MT and Sarpang harvested 6,746 MT of main cereals in 2021. These three *dzongkhags* accounted for more than one fifth (27 percent) of the total harvested production of main cereals in 2021. Table 3.01 shows the harvested production of main cereals by type in 2021.

3.2.1 Harvest of paddy

Among main cereal crops, paddy and maize are the commonly grown cereal crops in the country. A total of 40,081 MT (see Table 3.02) of irrigated paddy was harvested in 2021. This was 13,280 MT lesss than in 2020. A total of 427 MT (300 MT less than in 2020) of upland paddy (see Table 3.03) was harvested. Punakha dzongkhag harvested 6,510 MT of irrigated paddy (1,329 MT less than in 2020) while Paro dzongkhag harvested 5,174 MT (2,848 MT less than in 2020) and Wangdue Phodrang harvested 4,470 MT (1,640 MT less than in 2020). Punakha (16 percent), Paro (13 percent) and Wangdue Phodrang (11 percent) dzongkhag accounted for the highest production of irrigated paddy in 2021 (see Figure 3.01). The production shares of the rest of *dzongkhags* which were less than 5 percent are not shown in the figure.

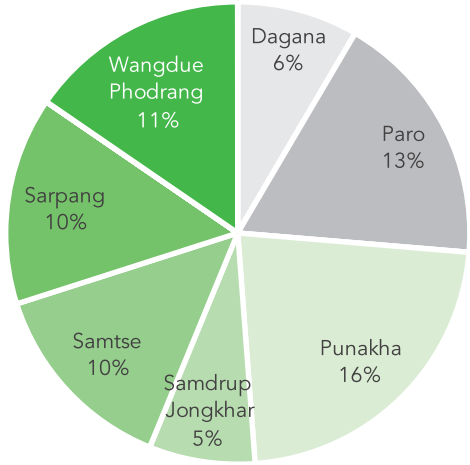

Figure 3.01 Production share of irrigated paddy by *dzongkhag*, 2021

During the period of four years from 2018-2021, the country has harvested variable paddy from 63,890 MT from

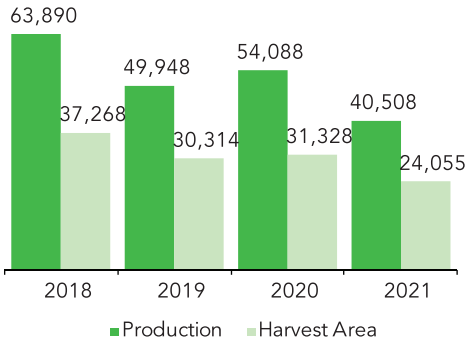

Figure 3.02 Production of paddy from 2018-2021

37,268 acres in 2018 to 40,508 MT from 24,055 acres in 2021 (see Figure 3.02).

Harvested production of paddy is observed to decrease gradually for many reasons. With the increasing urbanization and rapid socio-economic development, increasing amount of prime paddy wetland are being lost. Furthermore, agricultural holders are taking up more economically viable, less labor and resources intensive crops over paddy cultivation on wetland. Despite many interventions by the government in enhancing the paddy productivity, paddy growers in the country still face overwhelming challenges eventually leading to the gradual decrease in harvest area. The acreage under paddy is also slowly diminishing due to other competing crops such as growing of vegetables and other cash crops on wetland. Furthermore, in terms of irrigated paddy growers it has decreased from 28,516 holders in 2020 to 25,336 holders in 2021, an equivalent down 11 percent than in 2020 (see Figure 3.03).

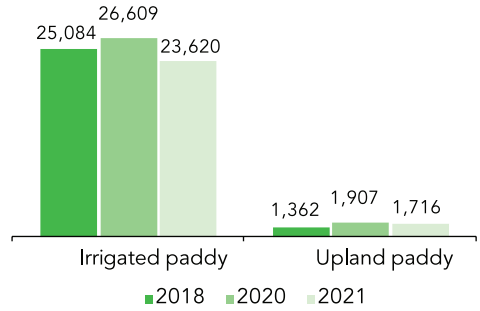

Figure 3.03 Paddy growers from 2018-2021

Table 3.02 Irrigated paddy production by *dzongkhag*, 2021

Dzongkhag	Irrigated Paddy		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	112.73	108.74	164.98
Chukha	1,047.12	907.49	1,539.71
Dagana	2,067.20	1,862.64	2,450.66
Gasa	96.28	95.86	129.41
Haa	79.73	72.28	87.16
Lhuentse	775.70	732.16	1,344.17
Mongar	510.53	474.61	554.94
Paro	2,064.62	1,943.88	5,174.28
Pema Gatshel	13.87	8.30	7.84
Punakha	3,331.30	3,084.99	6,509.57
Samdrup Jongkhar	1,395.70	1,333.39	2,143.26
Samtse	3,568.33	3,261.78	4,011.49
Sarpang	2,986.75	2,672.57	4,202.03
Thimphu	271.89	233.83	566.03
Trashigang	928.78	822.67	1,505.77
Trashi Yangtse	608.72	538.58	1,014.92
Trongsa	1,184.65	989.08	1,573.96
Tsirang	1,600.51	1,450.54	1,855.41
Wangdue Phodrang	2,593.45	2,244.61	4,470.44
Zhemgang	746.97	625.41	774.80
Bhutan	**25,984.87**	**23,463.41**	**40,080.82**

Table 3.03 Upland paddy production by *dzongkhag*, 2021

Dzongkhag	Upland Paddy		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	55.62	45.46	30.29
Dagana	30.71	29.50	7.57
Gasa	-	-	-
Haa	11.21	6.84	2.63
Lhuentse	42.80	40.82	37.67
Mongar	32.45	25.23	19.40
Paro	2.28	2.28	-
Pema Gatshel	7.36	6.43	1.43
Punakha	9.55	6.98	8.21
Samdrup Jongkhar	26.98	26.31	5.00
Samtse	67.87	56.22	54.91
Sarpang	55.27	52.26	16.50
Thimphu	3.11	3.11	-
Trashigang	96.94	76.61	76.42
Trashi Yangtse	74.30	62.99	69.61
Trongsa	19.57	13.91	14.32
Tsirang	45.59	44.63	0.63
Wangdue Phodrang	29.12	22.05	31.40
Zhemgang	102.98	70.05	51.10
Bhutan	**713.71**	**591.68**	**427.08**

3.2.2 Harvest of maize

Maize which is yet another mostly grown cereal crop in the country has harvested 30,939 MT in 2021. This was 10,026 MT less than in 2020, the equivalent of a 24 percent decline, and 24,321 MT less than the 55,259 MT recorded in 2018. The major maize growing *dzongkhags* – Monggar harvested 4,369 MT (less 1,793 MT than in 2020), Pema Gatshel harvested 4,205 MT (more 768 MT than in 2020) and Trashigang harvested 3,493 MT (less 3,103 MT than in 2020) in 2021. Monggar (14 percent), Pema Gatshel (14 percent) and Trashigang (11 percent) dzongkhag accounted for the highest production of maize in 2021 (see Figure 3.04). Similar trend as in paddy is observed for maize growers. Maize growers decreased from 43,776 holders in 2020 to 38,397 holders in 2021, an equivalent down 12 percent than in 2020 (see Figure 3.05).

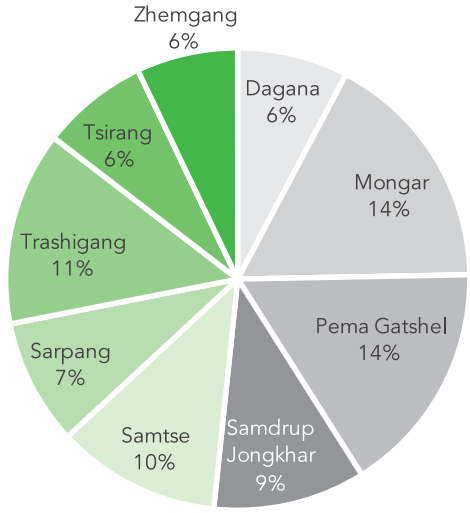

Figure 3.04 Production share of maize by *dzongkhag*, 2021

During the period of five years from 2018-2021 (see Figure 3.06), the harvest of maize has also fluctuated from 55,259 MT in 2018 to 30,939 MT in 2021. The climate change is already affecting our food supply. For example, in 2021 due to incessant rainfall acres of paddy crops were damaged in Paro, Punakha, Dagana, Tsirang and Zhemgang. Paddy and maize crops are also reported

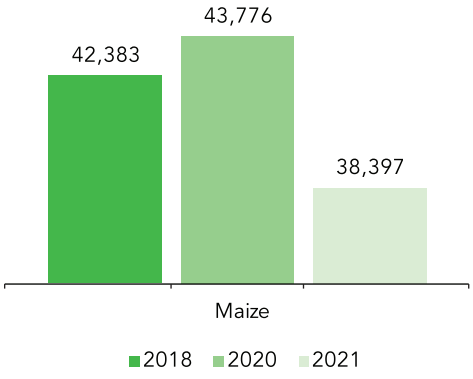

Figure 3.05 Maize growers from 2018-2021

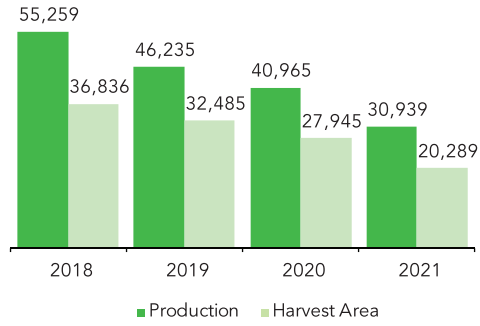

Figure 3.06 Production of maize from 2018-2021

to damage by wild animals such as elephants and wild boars. The lower levels of paddy and maize production in 2021 could be attributed to decrease in cultivated area, crop losses to wild animals, declining soil fertility and other challenges associated with domestic production.

In terms of area under paddy and maize cultivation, respectively 26,699 acres of paddy and 25,473 acres of maize was recorded in the 2021 AS. In general, the harvest area for both paddy and maize were observed to drop significantly in 2021 by respectively 7,272 acres and 7,655 acres than in 2020.

3.2.3 Harvest of wheat and buckwheat

Wheat and buckwheat products such as keptang (flat bread), khuli (pancake), putta (noodles) and dengo (dough) have become common meals for many urban consumers in the country. Although there is an increasing changing dietary habit and more preference for wheat and buckwheat products recently by the

Table 3.04 Maize production by *dzongkhag*, 2021

Dzongkhag	Maize		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	0.95	0.48	0.28
Chukha	1,494.45	1,153.48	1,446.53
Dagana	2,364.61	1,717.41	2,001.27
Gasa	0.10	0.10	0.10
Haa	123.45	92.86	111.97
Lhuentse	837.11	742.15	1,241.24
Mongar	3,757.77	3,179.65	4,369.04
Paro	23.42	18.91	9.85
Pema Gatshel	1,806.79	1,550.32	4,204.51
Punakha	159.10	117.03	147.75
Samdrup Jongkhar	2,138.03	1,990.91	2,750.26
Samtse	3,420.39	2,705.04	2,951.34
Sarpang	2,082.90	1,538.60	2,265.06
Thimphu	42.05	29.00	7.94
Trashigang	2,132.89	1,665.89	3,493.19
Trashi Yangtse	758.49	622.32	1,520.87
Trongsa	421.07	267.77	467.31
Tsirang	2,097.01	1,516.75	1,923.44
Wangdue Phodrang	143.93	109.02	195.18
Zhemgang	1,668.90	1,271.66	1,831.52
Bhutan	**25,473.41**	**20,289.34**	**30,938.64**

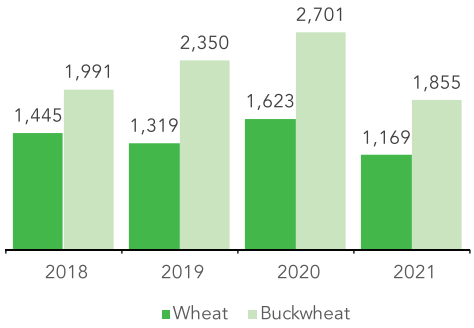

Figure 3.07 Wheat and buckwheat production from 2018-2021

urban consumers, the harvest of wheat and buckwheat have fallen in 2021.

A total of 1,169 MT of wheat (see Table 3.05) and 1,855 MT of buckwheat (see Table 3.06) were harvested. Harvested production of wheat fell to 1,169 MT (less 454 MT than in 2020) while buckwheat fell to 1,855 MT (less 846 MT than in 2020) in 2021 (see Figure 3.07).

Lower harvest of these cereals were reported in 2021 than in 2020. One reason for this could be the weather and the other was reduction in the cultivated or planted area for buckwheat (less 889 acres than in 2020) and low yield per acre for wheat (0.06 MT per acre less than in 2020) in 2021. In terms of growers, wheat has remained fairly stable while buckwheat varied but not as vivid as that of paddy and maize (see Figure 3.08).

3.2.4 Harvest of barley and millet

The 2021 AS collected information on the harvest of other cereals like barley and millet. Although these cereals are

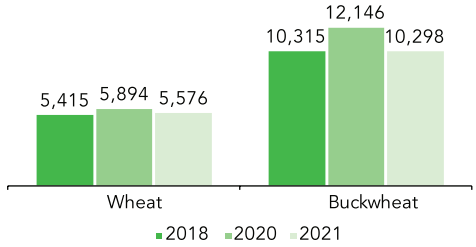

Figure 3.08 Wheat and buckwheat growers from 2018-2021

Table 3.05 Wheat production by *dzongkhag*, 2021

Dzongkhag	Wheat		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	383.78	338.11	175.19
Chukha	191.28	165.27	79.43
Dagana	39.01	35.17	12.27
Gasa	36.40	36.40	22.94
Haa	385.82	293.45	149.20
Lhuentse	7.41	6.70	2.65
Mongar	29.08	26.58	16.66
Paro	377.46	352.25	176.06
Pema Gatshel	7.35	5.04	3.04
Punakha	210.35	200.41	109.47
Samdrup Jongkhar	14.64	13.34	6.65
Samtse	47.06	42.92	18.88
Sarpang	1.01	1.01	0.58
Thimphu	129.91	105.20	64.47
Trashigang	35.54	32.55	17.01
Trashi Yangtse	0.79	0.45	0.25
Trongsa	179.06	148.06	76.79
Tsirang	31.33	25.34	10.39
Wangdue Phodrang	448.59	410.56	204.89
Zhemgang	54.13	47.28	22.11
Bhutan	**2,609.99**	**2,286.09**	**1,168.94**

Table 3.06 Buckwheat production by *dzongkhag*, 2021

Dzongkhag	Buckwheat		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	683.29	603.19	303.91
Chukha	381.68	295.71	121.95
Dagana	217.55	189.53	86.10
Gasa	-	-	-
Haa	274.87	232.96	117.07
Lhuentse	0.51	0.51	0.28
Mongar	95.91	82.40	37.59
Paro	78.72	66.18	33.65
Pema Gatshel	84.25	77.92	47.37
Punakha	62.19	57.84	28.57
Samdrup Jongkhar	614.54	595.33	334.53
Samtse	228.02	201.96	94.48
Sarpang	113.84	106.63	51.11
Thimphu	10.35	8.48	4.39
Trashigang	259.43	221.86	111.37
Trashi Yangtse	11.92	9.16	4.09
Trongsa	461.45	317.39	147.82
Tsirang	142.71	121.91	37.95
Wangdue Phodrang	420.11	385.48	192.83
Zhemgang	260.00	207.15	100.25
Bhutan	**4,401.32**	**3,781.56**	**1,855.32**

cultivated in small scale, yet these are important for food security.

A total of 857 MT of barley (see Table 3.07) and 1,122 MT (see Table 3.08) of millet was recorded in 2021. The harvested production of barley fell by 266 MT while millet fell by 491 MT than in 2020 (see Figure 3.09).

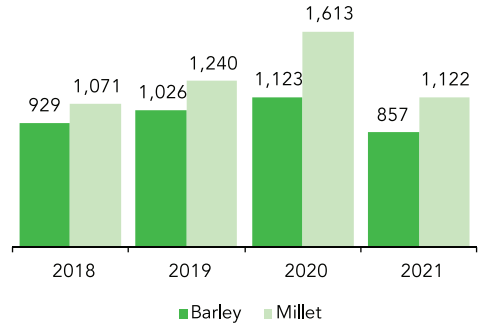

Figure 3.09 Barley and millet production from 2018-2021

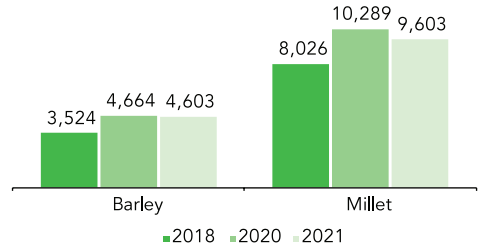

Figure 3.10 Barley and millet growers from 2018-2021

There was also reduction in the harvest area of barley (less 159 acres than in 2020) and millet (less 417 acres than in 2020) like any other cereals in 2021. The number of growers for barley and millet over the years remained quite stable (see Figure 3.10).

Table 3.07 Barley production by *dzongkhag*, 2021

Dzongkhag	Barley		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	322.13	284.33	148.18
Chukha	47.09	41.80	20.24
Dagana	50.41	44.80	19.55
Gasa	88.40	88.40	78.30
Haa	54.16	45.10	21.94
Lhuentse	0.88	0.27	0.11
Mongar	382.32	339.82	176.61
Paro	114.62	105.66	55.68
Pema Gatshel	10.62	9.55	5.17
Punakha	30.39	28.52	14.46
Samdrup Jongkhar	53.97	52.36	29.43
Samtse	11.74	9.84	3.60
Sarpang	0.65	0.65	0.17
Thimphu	56.56	43.14	21.69
Trashigang	84.68	66.35	36.91
Trashi Yangtse	6.24	5.97	3.37
Trongsa	318.38	281.48	145.24
Tsirang	4.38	3.25	1.01
Wangdue Phodrang	148.64	140.63	70.22
Zhemgang	17.65	12.94	5.34
Bhutan	**1,803.94**	**1,604.84**	**857.21**

Table 3.08 Millet production by *dzongkhag*, 2021

Dzongkhag	Millet		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	2.95	1.23	0.98
Chukha	362.34	323.00	147.83
Dagana	181.61	163.63	79.19
Gasa	-	-	-
Haa	39.27	33.10	17.40
Lhuentse	64.08	57.42	37.07
Mongar	18.65	16.29	7.47
Paro	3.39	2.92	2.08
Pema Gatshel	96.85	89.92	48.88
Punakha	1.40	1.40	0.73
Samdrup Jongkhar	78.44	72.25	34.63
Samtse	637.43	570.47	273.18
Sarpang	433.46	401.19	209.73
Thimphu	1.03	1.03	0.62
Trashigang	38.04	34.76	18.00
Trashi Yangtse	189.46	184.55	104.32
Trongsa	43.20	36.20	17.23
Tsirang	169.94	154.78	65.15
Wangdue Phodrang	19.38	16.91	7.73
Zhemgang	132.83	111.96	49.88
Bhutan	**2,513.76**	**2,273.04**	**1,122.11**

3.2.5 Harvest of quinoa

Quinoa, which is yet another new crop introduced by the Ministry of Agriculture and Forests in 2015 to enhance the food and nutritional security of the Bhutanese people has been picking its cultivation in the recent years. Table 3.09 shows the quinoa production by *dzongkhag*. A total of about 37 MT of quinoa was harvested in 2021, which is 65 MT less than in 2020. The area under quinoa cultivation reduced to 101 acres (less 172 acres than in 2020) in 2021. The number of quinoa growers sharply decreased in 2021 compared to 2020 (see Figure 3.11).

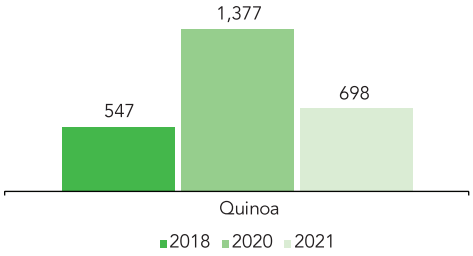

Figure 3.11 Quinoa growers from 2018-2021

Table 3.09 Quinoa production by *dzongkhag*, 2021

Dzongkhag	Quinoa		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	0.32	0.32	0.19
Chukha	4.24	3.50	1.42
Dagana	0.02	0.02	0.01
Gasa	-	-	-
Haa	0.49	0.20	0.10
Lhuentse	7.35	6.17	2.63
Mongar	10.05	10.05	4.15
Paro	-	-	-
Pema Gatshel	0.61	0.61	-
Punakha	2.67	2.67	1.20
Samdrup Jongkhar	2.80	2.80	1.25
Samtse	12.88	12.88	4.32
Sarpang	3.15	3.01	1.05
Thimphu	-	-	-
Trashigang	31.97	29.18	14.89
Trashi Yangtse	2.22	2.02	0.69
Trongsa	3.88	2.27	1.04
Tsirang	7.22	5.91	0.62
Wangdue Phodrang	2.24	1.81	0.96
Zhemgang	9.14	5.14	2.53
Bhutan	**101.26**	**88.56**	**37.06**

Chapter 4
OILSEEDS AND PULSES

4.1 INTRODUCTION

This chapter introduces different types of oilseeds and pulses harvested in the country. The chapter includes statistics on area and production of various oilseeds and pulses in the country disaggregated by *dzongkhag*. Oilseeds and pulses play an important role as they are rich in energy and protein, which are essential for human diet.

The predominant oilseeds crops grown in the country are mustard and soya bean. Pulses are dry edible seeds of leguminous plants. They are also called grain legumes mostly consumed in the form of seeds in whole, split, hulled split or flour. Pulses are considered nutritious and important sources of proteins. According to GPF 2020, growing of pulses decrease GhG gases and improves soil fertility. The main pulses grown in the country are rajma beans, mung beans and lentil.

However, differential production performances of these crops has become a cause of concern. Globally, the production of oilseeds has exhibited positive growth with the improvement in the farming techniques with hi-technology. For the case of Bhutan,

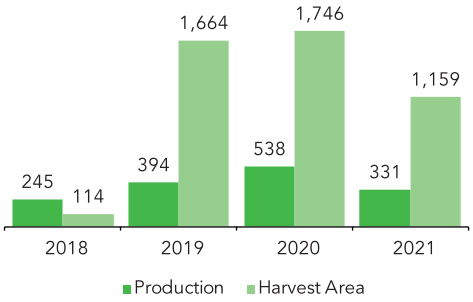

Figure 4.01 Production of mustard from 2018-2021

the harvested production of oilseeds and pulses have been seeing unusual growth over the last few years.

4.2 PRODUCTION OF MAIN OILSEEDS AND PULSES

In 2021, the harvest of main oilseeds and pulses was lower than in 2020, in part reflecting the decline in the area harvested. The overall decline was principally due to lower harvested production levels for mustard (206 MT less than in 2020), groundnut (266 MT less than in 2020), beans dry (165 MT less than in 2020) and rajma beans (487 MT less than in 2020).

There was considerable reduction in the harvested area for many oilseeds and pulses. The downward trend both

Table 4.01 Oilseeds and pulses production by type, 2021

Type	Sown Area (Acre)	Harvest Area (Acre)	Production (MT)
Mustard	1,326.67	1,158.64	331.38
Sunflower	7.91	7.33	2.8
Soya bean	316.15	266.3	90.22
Groundnut	178.21	156.79	47.75
Perilla	136.72	112.64	25.82
Beans (dry)	819.38	723.09	320.22
Rajma beans	817.72	680.75	362.77
Mung beans	1,186.63	1,032.38	380.75
Lentil	60.71	38.9	15.4

in harvested production and area (see Figure 4.01 in the case of mustard cultivation) for these crops may be due to the fact that there are not many consumers in the country. The acreage under oilseeds and pulses cultivation is slowly diminishing as it is not economically viable.

Furthermore, the Ministry of Agriculture and Forests estimated higher cost of production for oilseeds and pulses in the country and consumers have access to cheap imports. For example, the cost of production for mustard was estimated at Nu.51 per kg. There are other observed reasons such as that of holders growing oilseeds and pulses as secondary crop. Table 4.01 shows the harvested production of oilseeds and pulses by type in 2021.

Table 4.02 Mustard production by *dzongkhag*, 2021

Dzongkhag	Mustard		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	51.80	35.58	6.49
Chukha	119.68	112.36	28.40
Dagana	127.02	108.95	24.58
Gasa	8.51	8.51	4.33
Haa	43.92	41.05	11.48
Lhuentse	21.80	21.66	6.39
Mongar	15.41	13.09	3.76
Paro	144.50	104.32	31.24
Pema Gatshel	28.18	23.06	7.76
Punakha	28.38	26.70	5.83
Samdrup Jongkhar	45.06	43.47	15.65
Samtse	146.26	139.84	42.30
Sarpang	175.82	159.02	41.33
Thimphu	28.66	24.30	6.05
Trashigang	41.38	37.32	14.67
Trashi Yangtse	0.86	0.73	0.06
Trongsa	39.60	34.11	10.41
Tsirang	98.44	91.84	18.16
Wangdue Phodrang	124.76	100.56	41.18
Zhemgang	36.63	32.19	11.32
Bhutan	**1,326.67**	**1,158.64**	**331.38**

4.2.1 Harvest of mustard, rajma beans and mung beans

Among oilseeds and pulses, mustard, rajma beans and mung beans are the commonly grown crops in the country. A total of 331 MT (see Table 4.02) of mustard was harvested in 2021. This was 206 MT less than in 2020.

A total of 363 MT of rajma beans (see Table 4.03) was harvested. Samtse dzongkhag harvested 42 MT of mustard

Table 4.03 Rajma beans production by *dzongkhag*, 2021

Dzongkhag	Rajma Beans		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	0.34	0.30	0.35
Chukha	25.56	24.91	13.35
Dagana	21.10	18.94	8.83
Gasa	0.27	0.27	0.61
Haa	1.97	1.77	0.63
Lhuentse	23.08	16.80	8.75
Mongar	190.99	137.73	55.29
Paro	10.87	10.77	4.65
Pema Gatshel	38.06	29.56	17.94
Punakha	-	-	-
Samdrup Jongkhar	210.42	207.05	138.43
Samtse	23.50	22.55	13.10
Sarpang	1.02	1.02	0.56
Thimphu	1.80	1.61	0.97
Trashigang	185.47	132.06	75.04
Trashi Yangtse	0.66	0.62	0.10
Trongsa	-	-	-
Tsirang	81.49	74.79	24.16
Wangdue Phodrang	-	-	-
Zhemgang	1.12	-	-
Bhutan	**817.72**	**680.75**	**362.77**

Table 4.04 Mung beans production by *dzongkhag*, 2021

Dzongkhag	Mung Beans		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	173.36	162.30	35.48
Dagana	278.49	250.94	86.83
Gasa	-	-	-
Haa	0.81	0.63	0.30
Lhuentse	0.75	0.32	0.04
Mongar	36.22	21.53	9.41
Paro	0.84	0.84	0.34
Pema Gatshel	14.89	14.58	7.69
Punakha	0.53	0.53	0.05
Samdrup Jongkhar	98.40	89.02	36.99
Samtse	167.76	150.07	58.36
Sarpang	177.48	154.35	79.26
Thimphu	-	-	-
Trashigang	47.20	33.55	15.69
Trashi Yangtse	5.26	2.23	1.36
Trongsa	-	-	-
Tsirang	179.99	147.72	47.49
Wangdue Phodrang	0.40	0.31	0.18
Zhemgang	4.26	3.46	1.27
Bhutan	**1,186.63**	**1,032.38**	**380.75**

(53 MT less than in 2020) while Sarpang dzongkhag harvested 41 MT (14 MT less than in 2020). As for rajma beans, Samdrup Jongkhar and Trashigang dzongkhags, respectively harvested 138 MT and 75 MT in 2021.

There were considerable contrasts among major mung bean (see Table 4.04) producing *dzongkhags*; there was sharp decline in the harvested production of mung bean for Dagana (down 53 MT than in 2020). The lower level of production of mung bean for Dagana dzongkhag was due to reduced harvest area of 192 acres compared to 2020. The harvested production for Tsirang dzongkhag was 13 MT less in 2021 than in 2020 despite an increase in the harvest area of 17 acres. By contrast, Samtse (up 13 MT) and Sarpang (up 29 MT) dzongkhags harvested slightly higher level of mung bean production

with increased harvested area for Samtse (up 34 acres).

4.2.2 Harvest of other oilseeds and pulses

The harvest of other oilseeds and pulses included sunflower at 3 MT (less 5 MT than in 2020), soya bean at 90 MT (less 144 MT than in 2020), groundnut at 48 MT (less 266 MT than in 2020), perilla at 11 MT (less 50 MT than in 2020), beans dry at 320 MT (less 165 MT than in 2020) and lentil at 15 MT (less 75 MT than in 2020). The harvested production of these oilseeds and pulses were not so significant. The details of other oilseeds and pulses production are provided in Annex Table A4.01 to Table A4.06.

Chapter 5
VEGETABLES AND SPICES

5.1 INTRODUCTION

Farmer grow more than one vegetable in Bhutan. Cabbage, cauliflower, chili, broccoli and beans are the most commercially viable vegetables grown in the country. This chapter presents different types of vegetables grown including area and production disaggregated by *dzongkhag*. Vegetables grown principally for animal feed are excluded based on the recommendations of the FAO.

5.2 PRODUCTION OF VEGETABLES AND SPICES

Table 5.01 shows the vegetables and spices production by type in 2021. About 32,546 MT of vegetables were produced in 2021. The major vegetables grown in the country are cabbage, cauliflower, and chili.

5.2.1 Harvest of cabbage and cauliflower

Cabbage and cauliflower are commonly grown vegetables in the country. These vegetables are consumed mostly as curry and sometimes it is used as salad. The total harvest of cabbage was 3,763 MT (see Table 5.02) in 2021. This was 4,066 MT less than the production level in 2020.

Table 5.01 Vegetables and spices production by type, 2021

Type	Sown Area (Acre)	Harvest Area (Acre)	Production (MT)
Asparagus	189.08	180.78	177.73
Broccoli	913.2	870.77	1,156.49
Cabbage	1,413.01	1,319.91	3,763.33
Cauliflower	991.1	947.12	1,648.18
Chili	3,992.58	3,439.29	5,864.16
Garlic leaves	-	-	1,779.46
Green leaves	-	-	254.67
Onion bulb	427.56	415.24	418.63
Spring/ bunching onion	252.28	247.47	227.23
Eggplant	227.94	218.86	303.21
Tomato	245.5	228.99	289.37
Pumpkins, squash & gourds	-	-	5,694.81
Cucumber	551.53	539.67	1,193.81
Carrot	456.89	438.11	873.95
Radish	1,266.01	1,244.17	3,161.56
Turnip	1,266.01	1,244.17	3,161.56
Peas (green/ fresh)	427.94	386.22	482.1
Beans (green/fresh)	1,760.71	149.67	2,095.81
Total vegetables	**14,381.33**	**11,870.45**	**32,546.07**
Ginger	3,237.07	3,079.88	7,153.99
Turmeric	178.94	176.94	202.85
Garlic	261.19	255	240.25
Cardamom	12,813.45	11,599.27	1,609.08
Coriander	173.72	170.71	136.33
Sichuan pepper	-	-	338.4
Total spices	**16,664.36**	**15,281.80**	**9,680.89**

Table 5.02 Cabbage production by *dzongkhag*, 2021

Dzongkhag	Cabbage		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	19.64	19.21	70.24
Chukha	80.28	73.98	179.25
Dagana	82.37	79.02	119.40
Gasa	18.17	18.17	56.42
Haa	56.57	52.65	184.10
Lhuentse	18.89	18.04	64.09
Mongar	76.32	73.16	208.18
Paro	277.36	235.07	903.11
Pema Gatshel	32.04	30.74	99.38
Punakha	31.99	30.07	88.55
Samdrup Jongkhar	45.85	45.13	100.12
Samtse	122.26	121.27	285.89
Sarpang	79.03	77.79	200.27
Thimphu	44.00	37.99	149.44
Trashigang	68.65	63.14	192.95
Trashi Yangtse	49.02	46.43	141.60
Trongsa	42.87	41.16	139.75
Tsirang	153.62	147.19	220.13
Wangdue Phodrang	80.94	77.89	280.98
Zhemgang	33.14	31.81	79.49
Bhutan	**1,413.01**	**1,319.91**	**3,763.33**

The overall fall in cabbage production in 2021 was due to the reduction in the harvest area (752 acres less than in 2020) and yield per acre. The yield per acre in 2021 was 2,851 kg, this was 928 kg less than in 2020. Paro dzongkhag which produced 2,935 MT of cabbage in 2020, harvested only 903 MT in 2021. The recorded yield per acre for Paro dzongkhag was 8,472 kg in 2020 while it got dropped to 3,842 kg per acre in 2021.

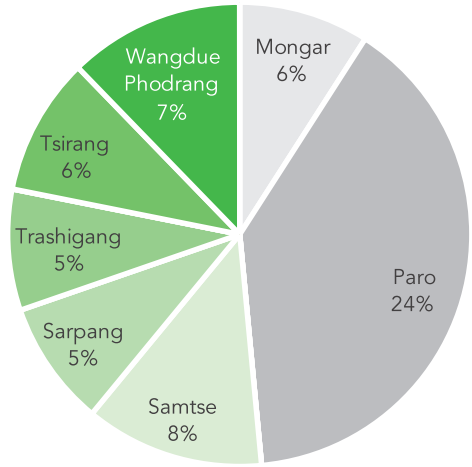

Figure 5.01 Production share of cabbage by *dzongkhag*, 2021

This was 4,630 kg per acre less in 2021 compared to 2020. Similarly, Wangdue Phodrang dzongkhag harvested only 281 MT in 2021 (less 374 MT than in 2020) and the per acre yield dropped from 6,772 kg in 2020 to 3,608 kg in 2021. Figure 5.01 shows the percentage share of cabbage production in 2021. Share of *dzongkhags* with less than 5 percent are not shown here.

Cauliflower also saw sharp decrease in the harvested production from 2,448 MT in 2020 to 1,648 MT (see Table 5.03) in 2021. This was about 800 MT less than in 2020.

The overall yield per acre was 1,740 kg in 2021 (less 303 kg per acre than in 2020). Thimphu and Lhuentse dzongkhags saw highest per acre yield drop in 2021. Thimphu dzongkhag harvested 2,223 kg (less 2,476 kg than in 2020) per acre in 2021 while

Table 5.03 Cauliflower production by *dzongkhag*, 2021

Dzongkhag	Cauliflower		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	11.24	11.15	25.23
Chukha	64.34	60.91	92.54
Dagana	103.93	98.35	137.81
Gasa	17.89	17.89	37.48
Haa	11.82	10.98	19.48
Lhuentse	13.04	12.15	18.06
Mongar	59.89	57.43	93.01
Paro	61.45	56.48	157.90
Pema Gatshel	16.37	16.20	28.20
Punakha	39.57	37.69	58.46
Samdrup Jongkhar	27.01	26.51	39.80
Samtse	83.50	83.20	120.01
Sarpang	77.71	77.06	129.32
Thimphu	59.97	52.08	115.79
Trashigang	25.10	21.92	41.54
Trashi Yangtse	40.76	37.95	58.29
Trongsa	36.28	35.51	61.71
Tsirang	175.78	171.80	314.83
Wangdue Phodrang	45.96	43.08	70.32
Zhemgang	19.50	18.77	28.36
Bhutan	**991.10**	**947.12**	**1,648.18**

Table 5.04 Beans production by *dzongkhag*, 2021

Dzongkhag	Beans		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	10.14	10.08	16.50
Chukha	118.80	109.65	138.25
Dagana	152.75	138.61	123.82
Gasa	13.21	13.21	23.01
Haa	22.59	19.27	31.30
Lhuentse	20.30	18.47	24.65
Mongar	138.43	116.21	153.36
Paro	115.94	104.44	192.56
Pema Gatshel	55.02	50.55	71.18
Punakha	139.94	126.85	185.54
Samdrup Jongkhar	100.03	97.54	134.42
Samtse	165.65	162.60	206.22
Sarpang	172.15	167.47	249.16
Thimphu	33.58	31.51	46.33
Trashigang	52.82	46.55	68.54
Trashi Yangtse	45.57	42.82	57.43
Trongsa	28.86	27.01	40.61
Tsirang	242.35	212.40	179.34
Wangdue Phodrang	73.99	63.98	80.77
Zhemgang	58.60	51.81	72.81
Bhutan	**1,760.71**	**1,611.04**	**2,095.81**

Lhuentse dzongkhag harvested 1,487 kg (less 1,613 kg than in 2020) per acre in 2021. However, the overall cabbage and cauliflower harvest in the country has remained rather stable between 2018 and 2021. The country harvested 4,035 MT of cabbage and 1,190 MT of cauliflower in 2018.

5.2.2 Harvest of beans and broccoli

Beans is one of the main vegetable crops grown in the country. The total harvest of beans was 2,096 MT (see Table 5.04) in 2021. This was 1,073 MT less than the production level in 2020. The overall fall in beans production in 2021 was due to the reduction in the harvest area (933 acres less than in 2020) rather than the yield per acre.

Table 5.05 Broccoli production by *dzongkhag*, 2021

Dzongkhag	Broccoli		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	8.84	8.73	16.74
Chukha	71.17	67.44	88.39
Dagana	77.59	73.47	91.70
Gasa	13.58	13.58	26.86
Haa	8.40	7.60	10.95
Lhuentse	15.50	14.66	21.82
Mongar	87.08	83.44	140.85
Paro	37.44	35.85	41.67
Pema Gatshel	24.44	23.67	35.81
Punakha	62.47	58.91	82.68
Samdrup Jongkhar	30.71	30.48	41.15
Samtse	68.41	67.61	81.61
Sarpang	62.66	62.14	89.45
Thimphu	42.71	38.57	52.48
Trashigang	28.08	24.60	38.22
Trashi Yangtse	37.78	35.19	49.12
Trongsa	33.35	32.13	58.65
Tsirang	128.64	123.35	105.23
Wangdue Phodrang	48.78	44.76	50.70
Zhemgang	25.55	24.60	32.39
Bhutan	**913.20**	**870.77**	**1,156.49**

The yield per acre in 2021 was 1,300 kg, this was 55 kg more than in 2020. Thimphu dzongkhag which produced 103 MT of beans in 2020, harvested only 46 MT in 2021. The recorded yield per acre for Thimphu dzongkhag was 2,392 kg in 2020 while it got dropped to 1,470 kg per acre in 2021. This was 922 kg per acre less in 2021 compared to 2020. Similarly, Punakha and Paro dzongkhags, respectively harvested 186 MT and 193 MT (respectively less 79 MT and 149 MT than in 2020) in 2021.

Broccoli also saw decrease in the harvested production from 1,727 MT in 2020 to 1,157 MT (see Table 5.05) in 2021. This was about 570 MT less than in 2020. The overall yield per acre was 1,328 kg in 2021 (less 232 kg per acre than in 2020). Tsirang and Monggar dzongkhags which accounted higher production share of broccoli in 2021 saw drop in the harvested production. Tsirang dzongkhag harvested 105 MT (less 61 MT than in 2020) while Monggar dzongkhag harvested 141 MT (less 103 MT than in 2020) in 2021. At the national level, the broccoli yield per acre of land dropped from 1,560 kg in 2020 to 1,328 kg in 2021.

5.2.3 Harvest of chili

Chili is a commercial crop and one of the most important vegetables grown in almost all 20 *dzongkhags* in the country. The total harvest of chili was 5,864 MT (see Table 5.06) in 2021. This was 3,469 MT less than the production level in 2020. The overall fall in production in 2021 was due to the reduction in the harvest area (326 acres less than in 2020) and yield per acre. The yield per acre in 2021 was 1,705 kg, this was 774 kg less than in 2020. Most of the chili growing *dzongkhags* like Paro and Punakha harvested lower level of production in 2021 than in 2020. Punakha dzongkhag harvested 413 MT (476 MT less than in 2020) while Paro

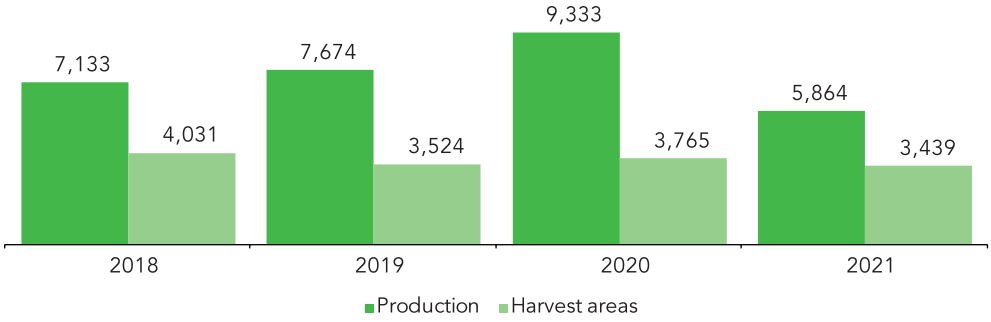

Figure 5.02 Production of chili from 2018-2021

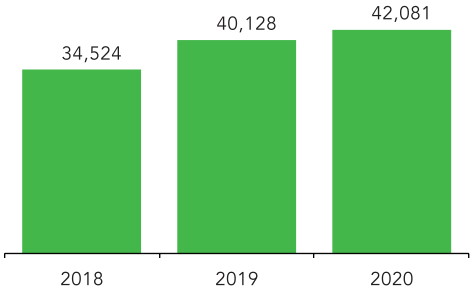

Figure 5.03 Chili growers from 2018-2021

harvested 999 MT (663 MT less than in 2020) in 2021.

The harvested production of chili in the country shows unusual trend (see Figure 5.02) between 2018 to 2021. A total of 7,133 MT of chili was harvested from 4,031 acres in 2018. In terms of harvest area, it has not changed much between 2018 to 2021 while the recorded yields per acre were variable. The yield per acre was 1,770 kg in 2018, 2,180 kg in 2019, 2,480 kg in 2020 and 1,710 kg in 2021. The number of growers increased from 40,128 households in 2020 to 42,081 households in 2021 (see Figure 5.03).

Table 5.06 Chili production by *dzongkhag*, 2021

Dzongkhag	Chili		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	46.51	46.13	131.16
Chukha	173.07	149.25	275.43
Dagana	245.85	205.63	270.76
Gasa	7.81	7.81	12.70
Haa	37.83	34.01	59.97
Lhuentse	214.79	167.00	303.72
Mongar	187.65	152.39	290.25
Paro	521.22	466.76	999.31
Pema Gatshel	93.17	87.60	166.65
Punakha	257.38	228.72	413.02
Samdrup Jongkhar	155.69	149.48	170.00
Samtse	204.79	199.06	260.58
Sarpang	189.37	171.16	237.83
Thimphu	178.21	154.83	285.24
Trashigang	276.44	228.53	399.86
Trashi Yangtse	215.86	169.06	282.19
Trongsa	169.57	147.09	275.85
Tsirang	327.19	293.70	381.42
Wangdue Phodrang	388.06	297.65	531.69
Zhemgang	102.12	83.44	116.53
Bhutan	**3,992.58**	**3,439.29**	**5,864.16**

5.2.4 Harvest of onion bulb and tomato

Onion bulb and tomatoes have been recently identified by the Ministry of Agriculture and Forests as mandatory vegetable crops in the country. Onion bulb and tomatoes are not only used as vegetables, but often used as salad or for production of pickles. There was considerable contrast for harvest of onion bulb (see Table 5.07) in 2021 compared to many other major vegetables.

A total of 419 MT (more 202 MT than in 2020) of onion bulb o was harvested in the country. Major onion bulb producing *dzongkhags* also saw sharp increase in the harvested production-Tsirang with 65 MT (up 34 MT than in 2020) and Dagana with 110 MT (up 82 MT than in 2020). Although the yield per acre remained constant (1,067 kg in 2020 and 1,008 kg in 2021) for onion bulb, the harvested area increased more than double from 203 acres in 2020 to 415 acres in 2021.

Harvest of tomato, on the other hand was 289 MT (see Table 5.08) in 2021. This was 69 MT less and 17 acres less in terms of harvest area than in 2020. Samtse (up 6MT than in 2020) and Dagana (up 18 MT than in 2020) *dzongkhags* received positive growth in the harvested production of tomatoes in 2021 while for many other *dzongkhags*, the growth was otherwise.

Table 5.07 Onion bulb production by *dzongkhag*, 2021

Dzongkhag	Onion bulb		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	0.79	0.78	1.11
Chukha	11.91	11.28	11.35
Dagana	111.22	107.41	109.94
Gasa	0.60	0.60	0.57
Haa	3.29	3.08	2.97
Lhuentse	7.00	6.94	7.63
Mongar	9.87	9.53	10.17
Paro	1.91	1.91	2.21
Pema Gatshel	11.41	11.13	12.64
Punakha	27.52	27.03	27.22
Samdrup Jongkhar	13.92	13.89	12.63
Samtse	25.92	25.92	25.96
Sarpang	48.30	46.96	51.15
Thimphu	9.75	9.65	10.30
Trashigang	11.33	10.56	11.50
Trashi Yangtse	15.38	14.83	13.43
Trongsa	10.12	10.04	9.73
Tsirang	71.34	68.96	64.57
Wangdue Phodrang	23.54	22.91	20.93
Zhemgang	12.44	11.83	12.61
Bhutan	**427.56**	**415.24**	**418.63**

5.2.5 Harvest of asparagus, carrot and radish

There were considerable contrasts among asparagus, carrot and radish producing *dzongkhags*. A total of 178 MT (more 51 MT than in 2020) of asparagus (see Table 5.09), 874 MT (less 914 MT than in 2020) of carrot (see Table 5.10) and 2,576 MT (less 2,658 MT than in 2020) of radish (see Table 5.11) were harvested in

Table 5.08 Tomato production by *dzongkhag*, 2021

Dzongkhag	Tomato		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	5.16	5.16	6.82
Chukha	11.52	10.44	13.11
Dagana	33.72	31.49	42.02
Gasa	0.63	0.63	0.30
Haa	2.21	2.09	4.22
Lhuentse	1.72	1.64	2.32
Mongar	4.58	4.04	4.39
Paro	6.96	6.49	8.71
Pema Gatshel	5.97	5.94	6.64
Punakha	15.59	13.61	14.37
Samdrup Jongkhar	18.20	17.02	20.84
Samtse	29.11	28.88	49.70
Sarpang	35.94	34.85	41.36
Thimphu	14.12	12.97	14.64
Trashigang	2.81	2.68	2.99
Trashi Yangtse	6.28	5.94	7.45
Trongsa	5.05	4.94	4.73
Tsirang	35.96	33.15	38.39
Wangdue Phodrang	7.36	4.63	3.99
Zhemgang	2.61	2.40	2.39
Bhutan	**245.50**	**228.99**	**289.37**

Table 5.09 Asparagus production by *dzongkhag*, 2021

Dzongkhag	Asparagus		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	7.70	7.70	2.38
Chukha	0.21	0.21	0.15
Dagana	1.52	0.99	0.42
Gasa	-	-	-
Haa	2.30	2.13	1.57
Lhuentse	1.25	1.23	0.83
Mongar	2.69	2.54	1.28
Paro	95.50	92.46	132.71
Pema Gatshel	2.04	2.01	2.38
Punakha	3.80	3.67	3.71
Samdrup Jongkhar	0.24	0.24	0.15
Samtse	-	-	-
Sarpang	0.02	0.02	0.02
Thimphu	25.86	24.86	20.03
Trashigang	6.26	5.94	3.98
Trashi Yangtse	4.66	4.53	1.84
Trongsa	1.17	1.17	2.13
Tsirang	20.77	18.38	0.87
Wangdue Phodrang	6.90	6.81	2.55
Zhemgang	6.21	5.89	0.73
Bhutan	**189.08**	**180.78**	**177.73**

2021. Asparagus harvest for many *dzongkhags* have improved over the years with the increase in the national yield per acre from 614 MT in 2020 to 983 MT in 2021. Paro and Thimphu accounted more than three-fourth of the total asparagus production in 2021.

About 874 MT (less 914 MT than in 2020) of carrot (see Table 5.10) were harvested from 438 acres in 2021. Haa and Chhukha dzongkhags accounted for the majority production of carrot in 2021, respectively with 275 MT and 215 MT. About 2,576 MT (less 2,658 MT than in 2020) of radish (see Table 5.11) were harvested from 1,176 acres in 2021. The per acre yield for carrot and radish fell in 2021, respectively at 1,995 kg (down 645 kg than in 2020) and 2,189 kg (down 14 kg than in 2020). The detailed productions of other vegetables are provided in annex tables Table A5.01 to Table A5.09.

Table 5.10 Carrot production by *dzongkhag*, 2021

Dzongkhag	Carrot		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	11.96	11.62	28.54
Chukha	70.42	66.83	215.49
Dagana	9.73	9.50	10.33
Gasa	2.73	2.73	4.43
Haa	159.88	152.50	275.48
Lhuentse	3.36	3.32	5.17
Mongar	15.35	15.11	21.62
Paro	38.49	36.74	77.30
Pema Gatshel	3.00	2.97	4.11
Punakha	10.11	9.65	15.66
Samdrup Jongkhar	12.08	12.06	16.25
Samtse	7.93	7.60	8.94
Sarpang	8.80	8.78	13.29
Thimphu	42.45	40.85	82.79
Trashigang	5.92	5.35	8.91
Trashi Yangtse	9.65	9.27	14.38
Trongsa	17.13	16.08	31.33
Tsirang	11.88	11.76	14.87
Wangdue Phodrang	10.56	10.16	16.26
Zhemgang	5.46	5.22	8.81
Bhutan	**456.89**	**438.11**	**873.95**

Table 5.11 Radish production by *dzongkhag*, 2021

Dzongkhag	Raddish		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	7.32	7.24	17.25
Chukha	65.30	64.55	138.61
Dagana	62.87	61.37	108.46
Gasa	8.94	8.94	19.91
Haa	54.35	50.86	92.96
Lhuentse	11.80	11.74	25.93
Mongar	82.75	78.21	149.50
Paro	61.82	59.76	146.31
Pema Gatshel	45.15	43.98	121.76
Punakha	46.63	45.32	80.89
Samdrup Jongkhar	86.60	86.55	152.14
Samtse	86.79	86.27	180.03
Sarpang	47.75	47.47	97.70
Thimphu	81.98	80.71	239.97
Trashigang	69.88	68.06	167.69
Trashi Yangtse	46.98	45.31	86.05
Trongsa	23.23	23.16	47.91
Tsirang	93.99	92.71	145.99
Wangdue Phodrang	189.53	184.92	495.91
Zhemgang	31.40	29.34	60.80
Bhutan	**1,205.06**	**1,176.47**	**2,575.79**

5.2.6 Harvest of cardamom

Among major spices grown in the country, cardamom and ginger are mostly grown as export commodities. Cardamom and ginger farming have become promising livelihood options for many farmers. Cardamom and ginger farming cultivation have now expanded to many *dzongkhags*. The harvest of cardamom in the country was 1,542 MT in 2018 while it was 1,609 MT in 2021.

The harvest area over the years have decreased from 21,395 acres in 2018 to 11,599 acres in 2021 (see Figure 5.04).

About 1,609 MT (see Table 5.12) of cardamom were harvested from 11,599 acres in 2021. This was 566 MT less than in 2020. Climate change has been significantly impacting the traditional management practices of cardamom farming. The harvested production of cardamom has become uncertain due to

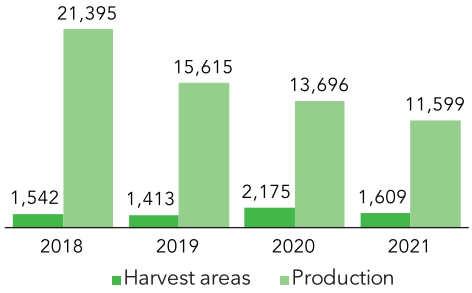

Figure 5.04 Production of cardamom from 2018-2021

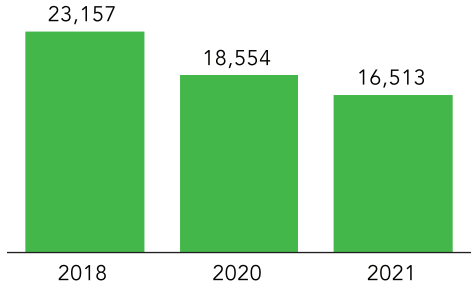

Figure 5.05 Cardamom growers from 2018-2021

persistent pests and diseases. Climate change and all these challenges have impacted the productivity and production of cardamom growers. The yield per acre was recorded at 140 kg in 2021, less 20 kg than in 2020. Major cardamom growing *dzongkhags*- Samtse (less 253 MT than in 2020), Tsirang (less 130 MT than in 2020), Dagana (less 23 MT than in 2020) and Chhukha (less 75 MT than in 2020) recorded lower levels of production in 2021. The number of growers also decreased from 18,554 households in 2020 to 16,513 households in 2021 (see Figure 5.05).

Table 5.12 Cardamom production by *dzongkhag*, 2021

Dzongkhag	Cardamom		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	2,358.36	2,005.42	225.16
Dagana	1,988.56	1,764.81	250.38
Gasa	-	-	-
Haa	553.31	467.07	65.24
Lhuentse	65.38	60.72	7.14
Mongar	146.86	137.51	18.46
Paro	-	-	-
Pema Gatshel	333.40	303.75	97.70
Punakha	29.97	29.82	4.67
Samdrup Jongkhar	374.38	368.65	47.56
Samtse	2,764.67	2,616.58	294.62
Sarpang	1,390.40	1,299.80	199.91
Thimphu	-	-	-
Trashigang	92.45	86.61	11.29
Trashi Yangtse	12.60	11.26	1.71
Trongsa	470.64	405.64	53.15
Tsirang	1,617.12	1,524.21	266.90
Wangdue Phodrang	11.19	10.27	1.47
Zhemgang	604.17	507.14	63.73
Bhutan	**12,813.45**	**11,599.27**	**1,609.08**

5.2.7 Harvest of ginger

Harvest of ginger was 7,154 MT (see Table 5.13) in 2021. This was 1,736 MT less than in 2020. A similar observation was noted for ginger farming in terms of the production levels for major producing *dzongkhags*. Samdrup Jongkhar harvested 2,189 MT (less 340 MT than in 2020), Samtse 1,364 MT (less 296 MT than in 2020) and Chhukha 1,422 MT (less 819 MT than

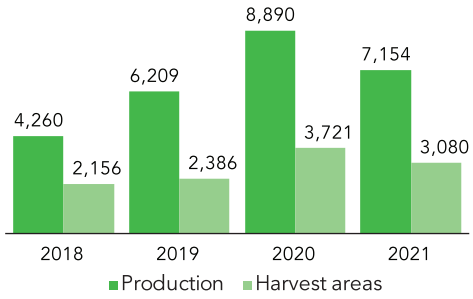

Figure 5.06 Production of ginger from 2018-2021

Table 5.13 Ginger production by *dzongkhag*, 2021

Dzongkhag	Ginger		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	577.17	556.24	1,421.93
Dagana	168.52	162.11	214.31
Gasa	0.03	0.03	0.04
Haa	3.76	2.74	3.41
Lhuentse	10.03	9.97	17.10
Mongar	31.17	28.51	51.35
Paro	0.14	0.14	0.15
Pema Gatshel	130.40	119.85	250.62
Punakha	3.28	3.19	5.41
Samdrup Jongkhar	910.45	899.08	2,188.60
Samtse	609.90	532.37	1,363.88
Sarpang	290.05	271.42	540.49
Thimphu	-	-	-
Trashigang	37.97	36.13	68.30
Trashi Yangtse	15.09	15.04	24.25
Trongsa	5.48	5.48	10.59
Tsirang	184.65	180.33	440.81
Wangdue Phodrang	8.43	8.32	15.93
Zhemgang	250.53	248.91	536.80
Bhutan	**3,237.07**	**3,079.88**	**7,153.99**

in 2020) in 2021. The national yield per acre declined from 2,389 kg in 2020 to 2,323 kg in 2021. About 641 acre reduction in the harvested area was observed in 2021 compared to previous year. Figure 5.06 provides the trend in the production of ginger from 2018 to 2021.

5.2.8 Harvest of sichuan pepper

The 2021 AS collected information on the production of Sichuan pepper for the first time in the survey during the reference year. The harvested production here refers to domesticated Sichuan pepper and do not include those collected as NWFP from the forests. Sale of Sichuan pepper or thingye fetches good price to farmers. The number of thingye growers have increased recently in many *dzongkhags*. The harvested production of Sichuan pepper was a little more than 30 MT (see Table 5.14) in 2021. Monggar harvested 6 MT while Trongsa and Trashi Yangtse, respectively harvested 5 MT each. The production of other spices in 2021 such as that of turmeric, garlic and coriander are provided in the Annex Table A5.10 to Table A5.12.

Table 5.14 Sichuan pepper production by *dzongkhag*, 2021

Dzongkhag	Sichuan Pepper
	Production (MT)
Bumthang	0.03
Chukha	0.79
Dagana	2.56
Gasa	-
Haa	1.39
Lhuentse	1.65
Mongar	6.12
Paro	-
Pema Gatshel	2.03
Punakha	0.88
Samdrup Jongkhar	0.42
Samtse	0.01
Sarpang	0.10
Thimphu	0.83
Trashigang	1.91
Trashi Yangtse	4.52
Trongsa	4.77
Tsirang	1.14
Wangdue Phodrang	0.49
Zhemgang	0.79
Bhutan	**30.44**

Chapter 6
ROOTS AND TUBER

6.1 INTRODUCTION

According to FAO, many plants are grown chiefly for their roots or underground stems. These plants are generally known as roots and tubers. Roots and tubers are among the food crops, that is grown mainly for human consumption. Roots and tubers are plants yielding starchy roots, tubers, rhizomes, corms and stems. FAO recommends that the denomination "roots and tubers" excludes crops that are cultivated mainly for feed (mangolds, swedes) or for processing into sugar (sugar beets), and those classified as "roots, bulb and tuberous vegetables" (onions, garlic and beets).

The main roots and tubers grown in Bhutan are potato, sweet potato, cassava, taro and ground apple. Roots and tubers crops are considered important due to its richness in carbohydrates. Some roots and tubers provide minerals and essential vitamins, and often used as supplement crops in many countries to compensate for protein deficiencies. Roots and tubers (for example potato) crops in Bhutan still constitute an important and one of the components in our traditional diets.

Table 6.01 Roots & tuber production by type, 2021

Type	Sown Area (Acre)	Harvest Area (Acre)	Production (MT)
Potato	8,825.20	8,244.16	38,572.70
Sweet potato	59.71	51.97	53.44
Cassava	271.06	213.37	389.05
Taro	132.06	109.51	146.84
Ground apple	74.69	73.1	145.89

Urban consumers, over time, have developed more preference for roots and tubers crops such as potatoes and cassava. The roots and tubers crops as staple foods have become more important in urban areas.

6.2 PRODUCTION OF MAIN ROOTS AND TUBER CROPS

Table 6.01 shows the harvested production of roots and tuber by type in 2021. A total of about 39,308 MT of roots and tuber were produced in 2021. This was 7,347 MT less than in 2020, an equivalent 16 percent decline.

6.2.1 Harvest of potato

Among the roots and tuber, potato has been one of the highest cash crops exported to India and this generates a

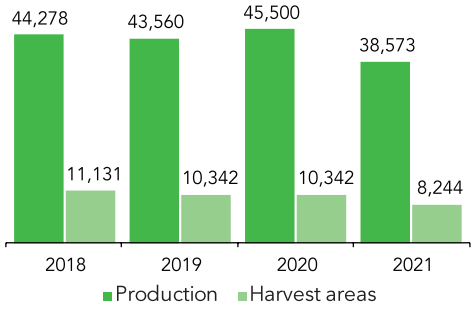

Figure 6.01 Production of potato from 2018-2021

lot of revenue to the farming population. The country harvested 38,573 MT (see Table 6.02) of potatoes in 2021, which was 6,928 MT less than in 2020 (a decrease of 15 percent). Most of the major potato producing *dzongkhags* had lower harvests in 2021-Wangdue Phodrang produced 10,815 MT (2,734 MT less than in 2020); Paro produced 4,370 MT (1,038 MT less than in 2020); and Monggar produced 3,752 MT (501 MT more than in 2020). During the period of four years from 2018-2021, the country has harvested 44,278 MT from 11,131 acres in 2018 to 38,573 MT from 8,244 acres in 2021 (see Figure 6.01).

The number of potato growers decreased to 33,737 (down 9 percent than in 2020) in 2021. Figure 6.02 shows the number of potato growers from 2018-2021.

6.2.2 Harvest of cassava

About 389 MT of cassava (see Table 6.03) was harvested in 2021. This was 219 MT less than in 2020. The per acre yield of cassava was recorded at 1,820

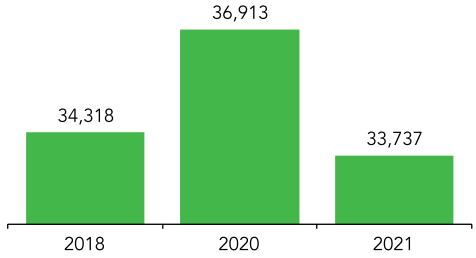

Figure 6.02 Potato growers from 2018-2021

Table 6.02 Potato production by *dzongkhag*, 2021

Dzongkhag	Potato		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	655.67	620.29	3,249.51
Chukha	485.39	463.55	2,567.76
Dagana	184.09	166.26	326.85
Gasa	47.90	47.90	211.85
Haa	277.71	253.63	1,252.29
Lhuentse	203.59	187.34	803.41
Mongar	1,061.45	961.17	3,752.16
Paro	881.20	836.66	4,369.64
Pema Gatshel	239.58	231.51	1,025.55
Punakha	102.04	94.13	370.66
Samdrup Jongkhar	282.51	276.54	684.11
Samtse	163.85	153.47	307.10
Sarpang	195.34	186.41	580.36
Thimphu	382.79	356.83	1,978.53
Trashigang	853.10	764.37	3,368.48
Trashi Yangtse	368.08	336.70	1,478.21
Trongsa	188.94	164.45	754.33
Tsirang	268.01	248.01	376.15
Wangdue Phodrang	1,888.69	1,814.44	10,815.47
Zhemgang	95.26	80.50	300.27
Bhutan	**8,825.20**	**8,244.16**	**38,572.70**

kg in 2021, less 80 kg than in 2020. Major cassava producing *dzongkhags*- Chhukha (less 52 MT than in 2020) and Samtse (less 93 MT than in 2020) reported lower level of production in 2021.

6.2.3 Harvest of other roots and tuber

The harvest of other roots and tuber included 53 MT of sweet potato (down 14 MT than in 2020), 147 MT of taro (down 97 MT than in 2020) and 146 MT of ground apple (down 90 MT than in 2020). Lower levels of harvested production were recorded in part due to significant reduction in the area cultivated. The detailed harvested production for these roots and tuber are provided in Annex Table A6.01 to Table A6.03.

Table 6.03 Cassava production by *dzongkhag*, 2021

Dzongkhag	Cassava/Tapioca		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	76.13	59.09	110.49
Dagana	44.09	34.49	76.07
Gasa	-	-	-
Haa	3.81	2.70	2.63
Lhuentse	-	-	-
Mongar	3.31	3.08	4.28
Paro	-	-	-
Pema Gatshel	17.54	13.54	29.26
Punakha	0.24	0.24	0.32
Samdrup Jongkhar	17.17	15.50	19.34
Samtse	63.68	46.93	86.96
Sarpang	10.61	8.12	16.52
Thimphu	-	-	-
Trashigang	0.66	0.54	1.41
Trashi Yangtse	0.24	0.12	0.24
Trongsa	-	-	-
Tsirang	29.45	25.52	32.68
Wangdue Phodrang	0.31	0.31	2.48
Zhemgang	3.80	3.18	6.36
Bhutan	**271.06**	**213.37**	**389.05**

Chapter 7
FRUITS

7.1 INTRODUCTION

World Health Organization (WHO) and Food and Agriculture Organization (FAO) advocates Fruits and Vegetables (F&V) as major sources of fiber in the diet and increased dietary fiber intake significantly reduces low-density lipoprotein (LDL) cholesterol, triglyceride levels, systolic blood pressure and thereby prevent non-communicable diseases. Bhutan produces a wide range of fruits and some nuts.

7.2 PRODUCTION OF FRUITS

About 48,342 MT of fruits were harvested in 2021, of which, 39,667 MT were major fruits (such as apple, mandarin and areca nut) and 208 MT were newly promoted fruits (such as watermelon, kiwi and dragon fruit). Table 7.01 shows the production of fruits by type in 2021.

7.2.1 Harvest of apple

Apple, mandarin and areca nut are major cash crops among fruit crops grown in the country. Although different varieties of apple are grown in the country, the 2021 AS did not collect information on individual variety.

Table 7.01 Fruits production by type, 2021

Type	Total trees	Bearing trees	Production (MT)
Apple	224,313	134,004	2,323.81
Pear	43,163	25,173	859.08
Peach	34,546	25,120	633.44
Plum	11,528	8,610	257.48
Apricot	3,792	2,160	40.76
Persimmon	6,961	3,712	97.48
Walnut	26,061	8,708	178.68
Lemons & lime	18,575	10,718	139.14
Areca nut	4,671,585	1,793,252	21,376.62
Mandarin	1,502,347	808,205	15,966.39
Hazelnut	666,716	61,814	14.2
Mango	73,755	27,892	530.52
Guava	56,101	43,864	823.64
Pomegranate	9,634	4,804	62.82
Avocado	71,926	6,555	73.46
Litchi	47,424	20,140	390.64
Jackfruit	8,208	3,272	365.6
Banana	657,730	263,506	3,173.64
Tree tomato	57,138	48,605	484.17
Dragon fruit	5,693	236	0.69
Kiwi	9,109	4,084	50.81
Papaya	11,800	8,562	164.08
Pineapple	210,802	104,999	128.19
Passionfruit	5,251	3,144	51.09
Watermelon	67.36*	59.70**	156.02

*Note: *Sown Area; **Harvest Area*

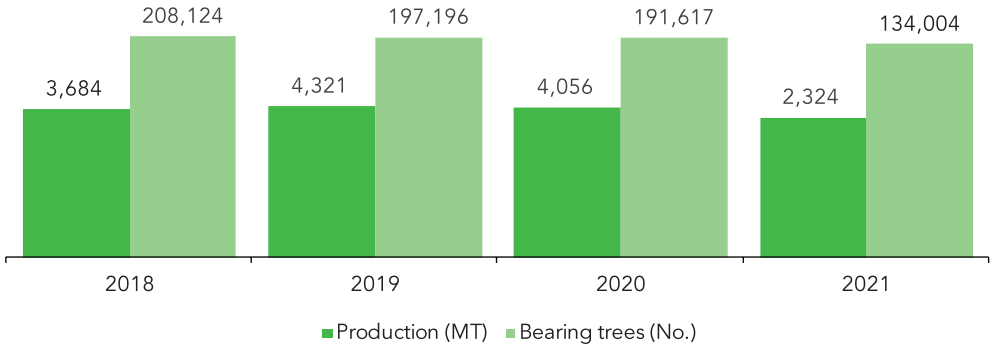

Figure 7.01 Production of apple from 2018-2021

About 2,324 MT of apple (see Table 7.02) were harvested in 2021. This was 1,732 MT less than in 2020 (see Figure 7.01). The per bearing tree yield of apple was recorded at 17 kg in 2021, less 4 kg than in 2020. Major apple producing *dzongkhags*–Paro harvested 1,511 MT (less 1,279 MT than in 2020) and Thimphu harvested 577 MT (less 190 MT than in 2020) in 2021.

In terms of the yield per bearing tree, Paro recorded at 17 kg (less 5 kg than in 2020) and Thimphu at 20 kg (less 2 kg than in 2020). The lower level of apple production in 2021 was due to reduction in bearing trees to 134,004 (less 57,613 trees than in 2020). Paro

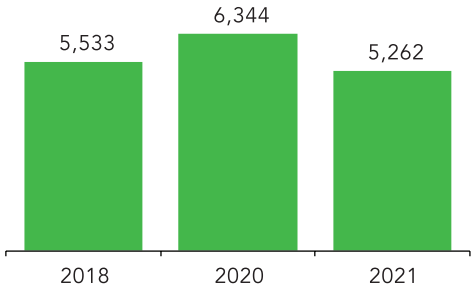

Figure 7.02 Apple growers from 2018-2021

Table 7.02 Apple production by *dzongkhag*, 2021

Dzongkhag	Apple		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	5,939	2,182	57.12
Chukha	4,782	1,492	36.80
Dagana	258	18	0.16
Gasa	6	-	-
Haa	13,099	7,075	84.94
Lhuentse	1,611	363	1.92
Mongar	785	292	3.59
Paro	141,068	91,214	1,510.91
Pema Gatshel	339	141	1.96
Punakha	121	65	1.19
Samdrup Jongkhar	1,285	23	0.16
Samtse	-	-	-
Sarpang	-	-	-
Thimphu	47,986	28,213	577.05
Trashigang	1,818	197	2.26
Trashi Yangtse	3,407	1,950	34.65
Trongsa	242	149	2.12
Tsirang	332	140	0.88
Wangdue Phodrang	954	456	8.06
Zhemgang	284	33	0.04
Bhutan	**224,313**	**134,004**	**2,323.81**

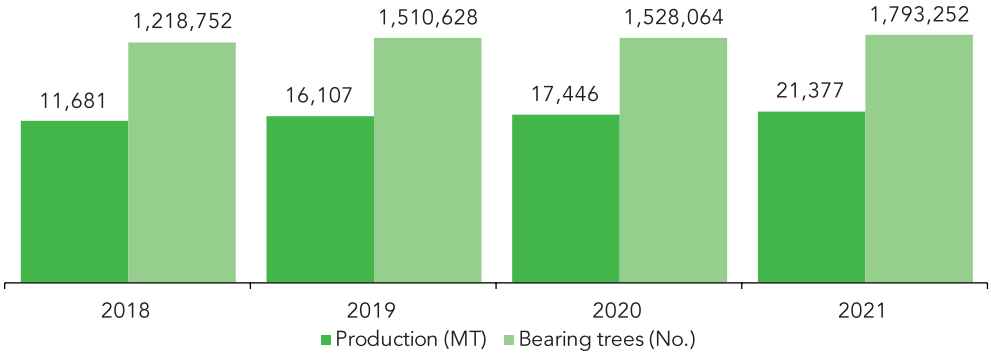

Figure 7.03 Production of areca nut from 2018-2021

dzongkhag alone reported 41,260 reductions in the bearing trees, about two-third of the total reductions. Thimphu and Bumthang dzongkhags reported, respectively 7,183 and 3,668 numbers of reduction in the bearing trees than 2020. Furthermore, the number of apple growers decreased from 6,344 in 2020 to 5,262 in 2021 (see Figure 7.02).

7.2.2 Harvest of areca nut

Bhutan exports areca nut to India during the peak season and equally if not more, imports from India during the lean season. Chewing doma pani is an integral part of our culture and enhancing the production to meet the domestic demand has become even more important.

About 21,377 MT of areca nut (see Table 7.03) were harvested in 2021. This was 3,931 MT more, equivalent 23 percent more than in 2020. The per bearing tree yield of areca nut was recorded at 12 kg in 2021, more 1 kg than in 2020.

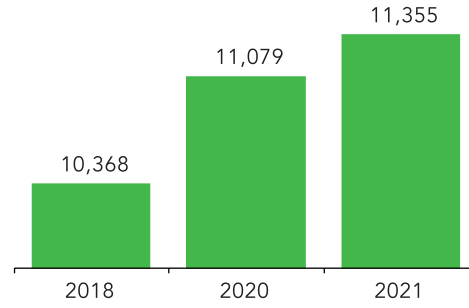

Figure 7.04 Areca nut growers from 2018-2021

Major areca nut producing *dzongkhags* – Samtse harvested 11,393 MT (more 3,902 MT than in 2020), Sarpang harvested 6,350 MT (more 630 MT than in 2020) and Samdrup Jongkhar harvested 1,605 MT (less 257 MT than in 2020) in 2021. In terms of the yield per bearing tree, Samtse recorded at 16 kg (more 1 kg than in 2020), Sarpang at 9 kg (more 0.5 kg than in 2020) and Samdrup Jongkhar at 16 kg (less 2 kg than in 2020) in 2021.

The higher level of areca nut production at the national level in 2021 was due to increase in bearing number of trees (see Figure 7.03) to 1,793,252 (more 265,188

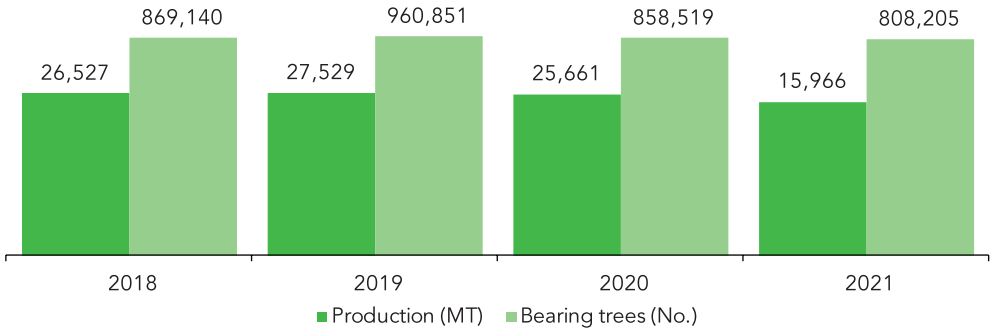

Figure 7.05 Production of mandarin from 2018-2021

Table 7.03 Areca nut production by *dzongkhag*, 2021

Dzongkhag	Areca nut		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	229,264	83,737	700.41
Dagana	430,893	165,405	1,111.14
Gasa	-	-	-
Haa	-	-	-
Lhuentse	-	-	-
Mongar	782	257	2.37
Paro	-	-	-
Pema Gatshel	76,156	14,572	101.25
Punakha	-	-	-
Samdrup Jongkhar	366,223	99,901	1,604.64
Samtse	1,751,716	733,795	11,393.46
Sarpang	1,768,061	687,692	6,350.19
Thimphu	-	-	-
Trashigang	-	-	-
Trashi Yangtse	-	-	-
Trongsa	-	-	-
Tsirang	6,121	725	9.47
Wangdue Phodrang	15	-	-
Zhemgang	42,353	7,168	103.68
Bhutan	**4,671,585**	**1,793,252**	**21,376.62**

trees than in 2020). Samtse dzongkhag alone reported 224,408 increase in the bearing trees, about 85 percent of the total increase. Dagana and Sarpang dzongkhags reported, respectively 31,799 and 14,748 number of increase in the bearing trees than 2020. The number of growers also increased from 11,079 households in 2020 to 11,355 households in 2021 (see Figure 7.04).

7.2.3 Harvest of mandarin

Mandarin is one of the country's largest fresh fruit exports to India and Bangladesh contributing to the economy by generating export revenue. Although the Ministry of Agriculture and Forests has been providing necessary support to mandarin growers in terms of orchards management, diversification of varieties based on different agro-ecological zones and development of processing and nurseries, growers are still facing many constraints. For example, production of mandarin is experiencing decline due to climate change impacts, more so due to increased pest and disease

outbreaks, drought and erratic rainfall, limited knowledge of farm management, etc.

About 15,966 MT of mandarin (see Table 7.04) were harvested in 2021. This was 9,694 MT less than in 2020. The per bearing tree yield of mandarin was recorded at 20 kg in 2021, less 10 kg than in 2020. Major mandarin producing *dzongkhags*- Dagana harvested 2,792 MT (less 1,014 MT than in 2020), Samdrup Jongkhar harvested 2,378 MT (less 926 MT than in 2020) and Tsirang harvested 2,148 MT (less 1,331 MT than in 2020) in 2021.

In terms of the yield per bearing tree, Dagana recorded at 21 kg (less 10 kg than in 2020), Samdrup Jongkhar at 23 kg (less 10 kg than in 2020) and Tsirang at 29 kg (less 7 kg than in 2020). The lower level of mandarin production in 2021 was due to reduction in bearing trees (see Figure 7.05) to 808,205 (less 50,314 trees than in 2020). Sarpang dzongkhag alone reported 49,341 reductions in the bearing trees, more than two-third of the total reductions. Tsirang dzongkhag reported 22,244 numbers of reduction in the bearing trees in 2021 than in 2020. The number of mandarin growers decreased in 2021 from 24,301 in 2020 to 21,904 (see Figure 7.06).

7.2.4 Harvest of watermelon, dragon fruit and kiwi

There has been increasing demand for seed and seedlings for newly introduced or promotional fruit crops in the country. Cultivation of watermelon,

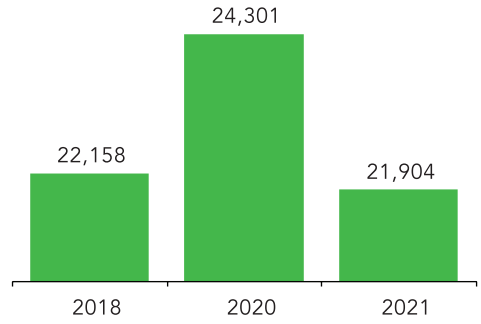

Figure 7.06 Mandarin growers from 2018-2021

Table 7.04 Mandarin production by *dzongkhag*, 2021

Dzongkhag	Mandarin		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	114,184	49,171	1,353.37
Dagana	225,820	131,028	2,791.97
Gasa	-	-	-
Haa	5,661	1,527	19.45
Lhuentse	18,050	10,404	168.29
Mongar	76,418	34,741	920.71
Paro	15	5	0.16
Pema Gatshel	221,138	144,365	591.74
Punakha	20,022	14,280	206.18
Samdrup Jongkhar	207,600	105,643	2,377.96
Samtse	91,058	37,550	872.67
Sarpang	110,585	72,739	1,772.16
Thimphu	-	-	-
Trashigang	29,986	13,220	250.86
Trashi Yangtse	18,511	11,175	277.05
Trongsa	13,062	7,046	114.61
Tsirang	123,752	74,793	2,147.73
Wangdue Phodrang	14,041	5,314	177.97
Zhemgang	212,445	95,203	1,923.52
Bhutan	**1,502,347**	**808,205**	**15,966.39**

Table 7.05 Watermelon production by *dzongkhag*, 2021

Dzongkhag	Watermelon		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	0.06	0.06	0.15
Chukha	0.12	0.10	0.17
Dagana	6.18	4.96	4.13
Gasa	0.01	0.01	0.02
Haa	0.04	0.04	0.12
Lhuentse	0.13	0.11	0.31
Mongar	4.05	3.87	6.47
Paro	0.18	0.18	0.28
Pema Gatshel	1.20	1.20	1.38
Punakha	1.53	0.89	1.43
Samdrup Jongkhar	1.26	1.26	2.90
Samtse	12.70	12.09	51.12
Sarpang	0.55	0.51	0.43
Thimphu	0.09	0.09	0.29
Trashigang	10.19	9.52	20.92
Trashi Yangtse	1.48	1.19	3.19
Trongsa	0.08	0.08	0.04
Tsirang	7.32	6.56	7.39
Wangdue Phodrang	0.58	0.57	0.76
Zhemgang	19.61	16.41	54.52
Bhutan	**67.36**	**59.70**	**156.02**

kiwi and dragon fruits are picking up and mass cultivations are happening in many *dzongkhags*. For example, commercial watermelon plantation and nursery already exist in few *dzongkhags* like Zhemgang, Samtse, Trashigang and Pema Gatshel.

About 156 MT of watermelon (see Table 7.05) were harvested in 2021. This was 103 MT more than in 2020. The per acre yield of watermelon was recorded at 2,613 kg in 2021, more 1,105 kg than in 2020. Major watermelon producing *dzongkhags*- Zhemgang harvested 55 MT (more 35 MT than in 2020), Samtse harvested 51 MT, Trashigang harvested 21 MT (more 19 MT than in 2020), Tsirang harvested 7 MT (less 3 MT than in 2020) and Monggar harvested 7 MT (more 6 MT than in 2020) in 2021.

About 67 acres of area was estimated by the 2021 AS under watermelon cultivation. This was 30 acres more than in 2020. From the total, Zhemgang, Samtse and Trashigang accounted about two-third of the total area under watermelon cultivation.

About 1 MT of dragon fruit (see Table 7.06) were harvested in 2021. This was marginal increase in the harvested production in 2021 than in 2020. The per bearing tree yield of dragon fruit was recorded at 3 kg in 2021, equivalent to that of 2020. Only 105 bearing trees were reported to increase in 2021. Not many *dzongkhags* reported to grow dragon fruits in 2021. Of those reported *dzongkhag*, Monggar and Tsirang accounted for the larger share of dragon fruit production in 2021.

Country recorded 51 MT (see Table 7.07) of kiwi production in 2021. This was 22 MT more than in 2020. An estimated 4,084 bearing kiwi trees (up 1,016 bearing trees than in 2020) existed in 16 *dzongkhags* in 2021. The per bearing tree yield was recorded at 12 kg in 2021 (more 3 kg than in 2020). Chhukha dzongkhag reported

Table 7.06 Dragon fruit production by *dzongkhag*, 2021

Dzongkhag	Dragon fruit		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	-	-	-
Dagana	724	3	0.01
Gasa	-	-	-
Haa	-	-	-
Lhuentse	47	16	0.01
Mongar	265	55	0.31
Paro	-	-	-
Pema Gatshel	1,776	36	0.05
Punakha	67	25	0.00
Samdrup Jongkhar	546	67	0.09
Samtse	353	-	-
Sarpang	758	-	-
Thimphu	-	-	-
Trashigang	7	-	-
Trashi Yangtse	-	-	-
Trongsa	-	-	-
Tsirang	1,122	29	0.22
Wangdue Phodrang	18	6	0.00
Zhemgang	8	-	-
Bhutan	**5,693**	**236**	**0.69**

Table 7.07 Kiwi production by *dzongkhag*, 2021

Dzongkhag	Kiwi		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	104	4	0.02
Chukha	3,929	2,281	40.69
Dagana	1,119	340	0.95
Gasa	-	-	-
Haa	-	-	-
Lhuentse	87	34	0.11
Mongar	81	20	0.09
Paro	47	26	0.43
Pema Gatshel	19	-	-
Punakha	207	62	1.66
Samdrup Jongkhar	231	74	0.21
Samtse	649	305	1.02
Sarpang	145	52	0.23
Thimphu	26	2	0.02
Trashigang	199	162	1.18
Trashi Yangtse	14	14	0.11
Trongsa	-	-	-
Tsirang	1,815	651	3.75
Wangdue Phodrang	147	29	0.15
Zhemgang	292	27	0.17
Bhutan	**9,109**	**4,084**	**50.81**

more than three-fourth of the total kiwi production in 2021. The detailed harvested productions of other fruit crops are provided in Annex Table A7.01 to Table A7.19.

ANNEX TABLES

Table A4.01 Sunflower production by *dzongkhag*, 2021

Dzongkhag	Sunflower		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	4.27	4.27	2.14
Chukha	-	-	-
Dagana	2.39	1.87	0.22
Gasa	-	-	-
Haa	0.03	0.03	0.02
Lhuentse	-	-	-
Mongar	-	-	-
Paro	-	-	-
Pema Gatshel	-	-	-
Punakha	0.01	0.01	0.01
Samdrup Jongkhar	-	-	-
Samtse	0.14	0.14	0.06
Sarpang	0.43	0.43	0.20
Thimphu	-	-	-
Trashigang	-	-	-
Trashi Yangtse	-	-	-
Trongsa	-	-	-
Tsirang	0.49	0.43	0.10
Wangdue Phodrang	0.06	0.06	0.02
Zhemgang	0.08	0.08	0.05
Bhutan	**7.91**	**7.33**	**2.80**

Table A4.02 Soya bean production by *dzongkhag*, 2021

Dzongkhag	Soya bean		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	19.06	17.01	5.62
Dagana	21.27	13.10	3.41
Gasa	-	-	-
Haa	-	-	-
Lhuentse	12.38	7.78	2.37
Mongar	10.79	8.72	1.85
Paro	-	-	-
Pema Gatshel	59.54	54.63	25.47
Punakha	3.62	3.59	1.07
Samdrup Jongkhar	24.71	22.24	8.14
Samtse	4.50	4.31	1.49
Sarpang	6.61	6.22	1.98
Thimphu	-	-	-
Trashigang	59.12	48.53	15.40
Trashi Yangtse	31.26	23.57	7.31
Trongsa	-	-	-
Tsirang	49.70	44.19	12.74
Wangdue Phodrang	0.29	0.29	0.07
Zhemgang	13.30	12.12	3.30
Bhutan	**316.15**	**266.30**	**90.22**

Table A4.03 Groundnut production by *dzongkhag*, 2021

Dzongkhag	Groundnut		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	0.04	0.02	0.03
Dagana	4.51	4.15	1.31
Gasa	-	-	-
Haa	-	-	-
Lhuentse	15.46	13.85	2.87
Mongar	4.20	4.12	1.13
Paro	0.01	0.01	0.01
Pema Gatshel	21.84	19.39	5.05
Punakha	9.63	9.18	1.76
Samdrup Jongkhar	1.22	0.78	0.17
Samtse	0.07	0.07	0.17
Sarpang	-	-	-
Thimphu	-	-	-
Trashigang	73.04	61.77	22.71
Trashi Yangtse	29.45	27.79	7.38
Trongsa	-	-	-
Tsirang	16.44	15.24	4.80
Wangdue Phodrang	1.18	0.31	0.21
Zhemgang	1.14	0.11	0.14
Bhutan	**178.21**	**156.79**	**47.75**

Table A4.04 Perilla production by *dzongkhag*, 2021

Dzongkhag	Perilla		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	3.64	3.41	0.86
Dagana	5.63	5.23	1.50
Gasa	-	-	-
Haa	13.80	8.37	2.73
Lhuentse	10.71	10.19	2.40
Mongar	2.37	2.22	1.10
Paro	-	-	-
Pema Gatshel	11.25	9.47	2.57
Punakha	3.91	3.49	1.14
Samdrup Jongkhar	11.34	10.23	1.81
Samtse	0.25	0.25	0.07
Sarpang	0.12	0.12	0.01
Thimphu	-	-	-
Trashigang	1.30	1.30	0.50
Trashi Yangtse	0.23	0.23	0.04
Trongsa	0.21	0.21	0.03
Tsirang	11.39	10.06	1.98
Wangdue Phodrang	1.76	1.69	0.43
Zhemgang	58.82	46.16	8.65
Bhutan	**136.72**	**112.64**	**25.82**

Table A4.05 Beans dry production by *dzongkhag*, 2021

Dzongkhag	Beans Dry		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	23.88	23.75	15.99
Dagana	387.95	335.12	124.22
Gasa	0.02	0.02	0.01
Haa	13.75	12.52	7.30
Lhuentse	3.35	3.17	2.05
Mongar	42.69	36.89	21.31
Paro	14.96	14.94	9.04
Pema Gatshel	34.50	27.63	16.98
Punakha	1.57	1.24	0.69
Samdrup Jongkhar	16.04	15.19	6.67
Samtse	28.30	25.97	11.87
Sarpang	69.87	68.23	38.34
Thimphu	1.86	1.68	1.04
Trashigang	15.39	10.69	5.84
Trashi Yangtse	9.18	7.93	4.00
Trongsa	-	-	-
Tsirang	150.66	135.65	53.81
Wangdue Phodrang	1.03	1.03	0.44
Zhemgang	4.38	1.44	0.60
Bhutan	**819.38**	**723.09**	**320.22**

Table A4.06 Lentil production by *dzongkhag*, 2021

Dzongkhag	Lentil		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	1.32	1.32	0.49
Dagana	8.47	6.04	1.69
Gasa	-	-	-
Haa	0.02	0.01	0.00
Lhuentse	-	-	-
Mongar	2.83	2.12	0.32
Paro	-	-	-
Pema Gatshel	0.07	0.07	-
Punakha	-	-	-
Samdrup Jongkhar	0.81	0.63	0.23
Samtse	0.81	0.78	0.34
Sarpang	18.86	5.93	3.23
Thimphu	0.11	0.11	0.06
Trashigang	-	-	-
Trashi Yangtse	-	-	-
Trongsa	-	-	-
Tsirang	13.06	9.85	4.32
Wangdue Phodrang	-	-	-
Zhemgang	14.35	12.03	4.73
Bhutan	**60.71**	**38.90**	**15.40**

Table A5.01 Garlic leaves production by *dzongkhag*, 2021

Dzongkhag	Garlic leaves
	Production (MT)
Bumthang	1.86
Chukha	3.32
Dagana	17.56
Gasa	0.04
Haa	2.77
Lhuentse	7.79
Mongar	17.01
Paro	0.32
Pema Gatshel	15.21
Punakha	16.45
Samdrup Jongkhar	18.76
Samtse	7.73
Sarpang	5.94
Thimphu	4.69
Trashigang	43.13
Trashi Yangtse	14.50
Trongsa	5.70
Tsirang	15.05
Wangdue Phodrang	53.15
Zhemgang	3.69
Bhutan	**254.67**

Table A5.02 Green leaves production by *dzongkhag*, 2021

Dzongkhag	Green leaves
	Production (MT)
Bumthang	13.88
Chukha	145.19
Dagana	124.38
Gasa	22.55
Haa	42.51
Lhuentse	20.99
Mongar	56.97
Paro	32.59
Pema Gatshel	74.37
Punakha	55.46
Samdrup Jongkhar	163.20
Samtse	309.90
Sarpang	156.98
Thimphu	53.90
Trashigang	85.83
Trashi Yangtse	30.15
Trongsa	61.07
Tsirang	182.21
Wangdue Phodrang	75.67
Zhemgang	71.65
Bhutan	**1,779.46**

Table A5.03 Bunching onion production by *dzongkhag*, 2021

Dzongkhag	Bunching Onion		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	1.92	1.91	2.05
Chukha	3.31	3.19	2.95
Dagana	30.62	29.95	23.18
Gasa	5.38	5.38	5.30
Haa	10.85	10.58	10.38
Lhuentse	10.05	10.00	10.06
Mongar	7.37	7.12	6.99
Paro	1.67	1.67	1.43
Pema Gatshel	3.90	3.90	4.05
Punakha	35.38	35.14	35.90
Samdrup Jongkhar	8.46	8.46	5.27
Samtse	6.90	6.90	4.06
Sarpang	7.37	7.31	7.19
Thimphu	10.31	10.17	9.87
Trashigang	24.19	22.46	23.12
Trashi Yangtse	10.74	10.65	8.83
Trongsa	8.98	8.92	8.91
Tsirang	25.53	25.42	17.49
Wangdue Phodrang	33.32	32.38	34.57
Zhemgang	6.02	5.96	5.62
Bhutan	**252.28**	**247.47**	**227.23**

Table A5.04 Eggplant production by *dzongkhag*, 2021

Dzongkhag	Eggplant		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	2.74	2.74	9.15
Chukha	6.57	6.47	9.45
Dagana	16.66	16.13	17.71
Gasa	3.20	3.20	4.49
Haa	1.29	1.18	1.80
Lhuentse	7.47	6.88	9.95
Mongar	8.24	7.78	13.62
Paro	13.54	13.51	20.27
Pema Gatshel	5.08	5.03	5.92
Punakha	21.57	20.49	29.56
Samdrup Jongkhar	18.19	18.14	20.71
Samtse	13.63	13.43	17.24
Sarpang	10.57	10.43	13.31
Thimphu	8.55	8.34	11.62
Trashigang	12.48	12.03	23.13
Trashi Yangtse	23.24	22.52	30.26
Trongsa	6.48	6.45	9.42
Tsirang	23.18	21.44	22.14
Wangdue Phodrang	14.96	12.51	17.15
Zhemgang	10.31	10.13	16.30
Bhutan	**227.94**	**218.86**	**303.21**

Table A5.05 Pumpkin, squash & gourds production by *dzongkhag*, 2021

Dzongkhag	Pumpkins, squash & gourds
	Production (MT)
Bumthang	62.50
Chukha	602.78
Dagana	677.22
Gasa	-
Haa	127.83
Lhuentse	59.20
Mongar	229.38
Paro	123.67
Pema Gatshel	361.30
Punakha	170.81
Samdrup Jongkhar	377.80
Samtse	847.62
Sarpang	372.50
Thimphu	55.42
Trashigang	161.04
Trashi Yangtse	94.52
Trongsa	151.91
Tsirang	949.91
Wangdue Phodrang	75.50
Zhemgang	193.90
Bhutan	**5,694.81**

Table A5.06 Cucumber production by *dzongkhag*, 2021

Dzongkhag	Cucumber		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	1.36	1.36	4.09
Chukha	31.35	31.17	102.95
Dagana	45.00	43.51	144.70
Gasa	0.13	0.13	0.70
Haa	5.27	5.11	12.03
Lhuentse	7.68	7.61	17.01
Mongar	28.12	27.83	43.90
Paro	23.68	20.17	42.92
Pema Gatshel	23.31	23.28	69.98
Punakha	75.82	73.69	118.29
Samdrup Jongkhar	51.34	50.25	89.67
Samtse	42.62	42.20	100.99
Sarpang	32.26	32.26	58.71
Thimphu	9.67	9.49	13.69
Trashigang	55.31	54.22	90.83
Trashi Yangtse	14.60	14.57	43.55
Trongsa	13.19	13.07	20.43
Tsirang	49.47	48.83	148.22
Wangdue Phodrang	28.32	28.23	40.59
Zhemgang	13.00	12.67	30.55
Bhutan	**551.53**	**539.67**	**1,193.81**

Table A5.07 Turnip production by *dzongkhag*, 2021

Dzongkhag	Turnip		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	6.95	6.93	13.61
Chukha	77.97	75.86	239.61
Dagana	10.76	10.52	15.93
Gasa	4.84	4.84	9.96
Haa	216.41	205.98	447.00
Lhuentse	1.78	1.73	2.88
Mongar	5.57	4.97	7.27
Paro	80.64	80.36	305.18
Pema Gatshel	2.87	2.85	11.01
Punakha	28.46	27.63	51.31
Samdrup Jongkhar	1.47	1.47	1.43
Samtse	0.90	0.86	1.94
Sarpang	-	-	-
Thimphu	148.11	146.80	373.52
Trashigang	3.64	3.56	6.16
Trashi Yangtse	3.31	3.17	4.83
Trongsa	5.55	5.55	13.22
Tsirang	7.63	6.86	9.55
Wangdue Phodrang	654.96	650.30	1,637.37
Zhemgang	4.18	3.93	9.80
Bhutan	**1,266.01**	**1,244.17**	**3,161.56**

Table A5.08 Peas production by *dzongkhag*, 2021

Dzongkhag	Peas		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	3.75	3.49	6.08
Chukha	27.40	26.73	30.56
Dagana	18.29	15.43	12.60
Gasa	0.01	0.01	0.00
Haa	47.40	44.21	66.94
Lhuentse	4.02	3.70	4.18
Mongar	32.74	29.77	40.65
Paro	46.57	38.02	54.91
Pema Gatshel	8.97	6.87	10.08
Punakha	45.69	40.39	51.56
Samdrup Jongkhar	46.23	45.91	42.48
Samtse	13.08	12.45	16.21
Sarpang	9.67	9.53	11.22
Thimphu	34.46	26.55	40.92
Trashigang	11.25	10.36	17.66
Trashi Yangtse	4.78	4.48	5.09
Trongsa	7.92	6.88	10.70
Tsirang	55.24	51.92	51.03
Wangdue Phodrang	8.18	7.40	6.17
Zhemgang	2.29	2.12	3.07
Bhutan	**427.94**	**386.22**	**482.10**

Table A5.09 Beetroot production by *dzongkhag*, 2021

Dzongkhag	Beetroot		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	8.87	8.45	23.98
Dagana	0.08	0.04	0.12
Gasa	-	-	-
Haa	1.35	1.08	1.62
Lhuentse	-	-	-
Mongar	0.00	0.00	0.01
Paro	10.56	10.16	42.42
Pema Gatshel	-	-	-
Punakha	0.30	0.04	0.06
Samdrup Jongkhar	-	-	-
Samtse	0.10	0.10	0.13
Sarpang	-	-	-
Thimphu	0.20	0.18	0.27
Trashigang	0.07	0.07	0.12
Trashi Yangtse	0.24	0.24	0.14
Trongsa	0.03	0.03	0.06
Tsirang	0.35	0.35	0.82
Wangdue Phodrang	0.26	0.26	0.09
Zhemgang	0.05	0.05	0.15
Bhutan	**22.47**	**21.06**	**69.98**

Table A5.10 Turmeric production by *dzongkhag*, 2021

Dzongkhag	Turmeric		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	0.03	0.03	0.03
Chukha	9.51	9.51	9.33
Dagana	21.50	21.50	23.45
Gasa	-	-	-
Haa	0.25	0.25	0.25
Lhuentse	0.77	0.76	0.83
Mongar	3.05	2.91	3.09
Paro	-	-	-
Pema Gatshel	17.66	17.66	20.17
Punakha	0.27	0.25	0.17
Samdrup Jongkhar	25.05	25.05	30.10
Samtse	30.25	29.27	46.92
Sarpang	15.98	15.98	18.08
Thimphu	-	-	-
Trashigang	0.40	0.38	0.29
Trashi Yangtse	0.26	0.26	0.27
Trongsa	1.17	1.17	1.06
Tsirang	23.80	23.55	21.71
Wangdue Phodrang	0.83	0.83	0.90
Zhemgang	28.14	27.57	26.21
Bhutan	**178.94**	**176.94**	**202.85**

Table A5.11 Garlic production by *dzongkhag*, 2021

Dzongkhag	Garlic		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	11.01	10.93	13.67
Chukha	4.76	4.56	3.36
Dagana	27.28	27.25	19.21
Gasa	0.01	0.01	0.02
Haa	0.28	0.27	0.28
Lhuentse	7.77	7.71	7.85
Mongar	17.52	17.21	16.70
Paro	6.92	6.92	6.80
Pema Gatshel	11.05	10.97	10.28
Punakha	9.15	9.10	8.66
Samdrup Jongkhar	30.72	30.45	22.49
Samtse	5.48	5.48	3.77
Sarpang	5.27	5.27	4.98
Thimphu	5.01	4.62	5.02
Trashigang	26.90	26.41	30.95
Trashi Yangtse	17.20	17.03	14.44
Trongsa	7.22	7.12	6.72
Tsirang	18.99	18.55	15.22
Wangdue Phodrang	39.34	37.07	41.18
Zhemgang	9.29	8.07	8.64
Bhutan	**261.19**	**255.00**	**240.25**

Table A5.12 Coriander production by *dzongkhag*, 2021

Dzongkhag	Coriander		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	1.80	1.80	1.87
Chukha	7.92	7.81	6.43
Dagana	9.49	9.47	6.40
Gasa	0.30	0.30	0.18
Haa	4.29	4.17	3.47
Lhuentse	3.35	3.35	3.23
Mongar	12.61	12.15	9.75
Paro	7.33	7.33	5.69
Pema Gatshel	6.48	6.47	3.89
Punakha	25.15	24.97	24.68
Samdrup Jongkhar	7.25	7.25	4.38
Samtse	6.99	6.93	3.37
Sarpang	5.86	5.82	4.70
Thimphu	16.30	15.76	15.63
Trashigang	5.10	4.99	4.94
Trashi Yangtse	10.29	10.13	9.07
Trongsa	8.37	8.34	7.63
Tsirang	14.07	13.63	8.50
Wangdue Phodrang	17.83	17.31	10.63
Zhemgang	2.94	2.72	1.88
Bhutan	**173.72**	**170.71**	**136.33**

Table A6.01 Sweet potato production by *dzongkhag*, 2021

Dzongkhag	Sweet Potato		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	2.58	2.50	2.02
Dagana	9.58	9.04	8.42
Gasa	-	-	-
Haa	0.14	0.12	0.13
Lhuentse	0.34	0.33	0.37
Mongar	9.53	8.37	8.55
Paro	0.03	0.01	0.03
Pema Gatshel	4.35	3.30	3.32
Punakha	1.78	1.46	1.63
Samdrup Jongkhar	2.91	2.36	1.72
Samtse	5.83	3.07	2.97
Sarpang	1.71	1.63	2.28
Thimphu	-	-	-
Trashigang	3.76	3.58	4.99
Trashi Yangtse	0.09	0.07	0.08
Trongsa	0.14	0.14	0.15
Tsirang	13.79	13.21	13.14
Wangdue Phodrang	0.11	0.02	0.02
Zhemgang	3.05	2.76	3.63
Bhutan	**59.71**	**51.97**	**53.44**

Table A6.02 Taro production by *dzongkhag*, 2021

Dzongkhag	Taro/Yautia/Collocasia		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	-	-	-
Chukha	16.36	14.28	20.46
Dagana	20.94	18.45	27.27
Gasa	-	-	-
Haa	0.79	0.68	1.00
Lhuentse	0.07	0.07	0.09
Mongar	9.31	8.39	13.94
Paro	-	-	-
Pema Gatshel	6.93	4.50	6.34
Punakha	0.01	0.01	0.03
Samdrup Jongkhar	9.95	9.57	7.93
Samtse	23.40	14.69	18.59
Sarpang	10.92	10.65	16.77
Thimphu	0.01	0.01	0.01
Trashigang	0.65	0.13	0.31
Trashi Yangtse	0.14	0.09	0.13
Trongsa	-	-	-
Tsirang	22.53	18.48	18.83
Wangdue Phodrang	-	-	-
Zhemgang	10.06	9.50	15.13
Bhutan	**132.06**	**109.51**	**146.84**

Table A6.03 Ground apple production by *dzongkhag*, 2021

Dzongkhag	Ground Apple		
	Sown Area (Acre)	Harvested Area (Acre)	Production (MT)
Bumthang	0.46	0.45	0.97
Chukha	3.66	3.47	7.89
Dagana	9.80	9.62	16.05
Gasa	-	-	-
Haa	1.27	1.25	2.74
Lhuentse	2.68	2.65	4.21
Mongar	5.06	4.91	11.33
Paro	1.07	1.06	2.73
Pema Gatshel	3.47	3.43	5.39
Punakha	4.61	4.51	8.56
Samdrup Jongkhar	3.80	3.70	4.18
Samtse	0.83	0.73	1.80
Sarpang	3.14	3.14	5.01
Thimphu	1.13	1.11	1.92
Trashigang	5.00	4.88	4.84
Trashi Yangtse	3.97	3.94	6.00
Trongsa	3.84	3.79	5.72
Tsirang	16.52	16.12	49.43
Wangdue Phodrang	2.19	2.18	2.89
Zhemgang	2.19	2.15	4.22
Bhutan	**74.69**	**73.10**	**145.89**

Table A7.01 Pear production by *dzongkhag*, 2021

Dzongkhag	Pear		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	444	255	6.87
Chukha	1,744	1,025	43.83
Dagana	1,953	1,352	186.63
Gasa	26	15	1.16
Haa	256	115	1.20
Lhuentse	4,199	2,208	46.93
Mongar	8,811	4,977	71.47
Paro	2,013	946	30.76
Pema Gatshel	1,740	883	18.67
Punakha	2,965	1,648	35.69
Samdrup Jongkhar	2,185	1,427	49.27
Samtse	572	514	33.23
Sarpang	918	755	26.10
Thimphu	1,272	607	13.85
Trashigang	5,442	3,168	74.19
Trashi Yangtse	2,644	1,689	31.17
Trongsa	1,009	667	10.47
Tsirang	2,635	1,933	142.02
Wangdue Phodrang	1,751	787	30.03
Zhemgang	584	203	5.53
Bhutan	**43,163**	**25,173**	**859.08**

Table A7.02 Peach production by *dzongkhag*, 2021

Dzongkhag	Peach		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	299	208	4.53
Chukha	1,983	1,429	39.55
Dagana	1,599	1,229	42.75
Gasa	22	15	0.97
Haa	505	275	4.81
Lhuentse	2,816	2,160	55.87
Mongar	3,676	2,608	50.56
Paro	2,179	1,727	68.33
Pema Gatshel	3,428	2,228	37.60
Punakha	2,566	1,556	34.04
Samdrup Jongkhar	2,137	1,645	41.41
Samtse	970	844	17.61
Sarpang	1,217	1,002	21.70
Thimphu	1,415	874	19.29
Trashigang	1,733	1,368	27.46
Trashi Yangtse	1,303	1,149	22.46
Trongsa	928	562	10.68
Tsirang	2,667	1,966	76.74
Wangdue Phodrang	1,405	958	25.28
Zhemgang	1,697	1,317	31.81
Bhutan	**34,546**	**25,120**	**633.44**

Table A7.03 Plum production by *dzongkhag*, 2021

Dzongkhag	Plum		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	398	253	6.51
Chukha	476	357	10.01
Dagana	1,178	937	41.87
Gasa	-	-	-
Haa	75	73	0.72
Lhuentse	1,325	932	23.04
Mongar	1,312	923	21.25
Paro	54	54	1.45
Pema Gatshel	433	329	7.31
Punakha	593	400	8.41
Samdrup Jongkhar	859	700	20.06
Samtse	96	83	1.72
Sarpang	768	654	14.77
Thimphu	435	320	9.80
Trashigang	566	463	9.63
Trashi Yangtse	439	357	8.15
Trongsa	294	159	3.52
Tsirang	1,446	1,116	56.21
Wangdue Phodrang	272	139	3.34
Zhemgang	507	361	9.70
Bhutan	**11,528**	**8,610**	**257.48**

Table A7.04 Apricot production by *dzongkhag*, 2021

Dzongkhag	Apricot		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	9	-	-
Chukha	910	299	4.84
Dagana	395	267	10.46
Gasa	-	-	-
Haa	118	92	1.57
Lhuentse	265	195	1.99
Mongar	28	17	0.36
Paro	127	53	1.26
Pema Gatshel	-	-	-
Punakha	296	145	2.27
Samdrup Jongkhar	-	-	-
Samtse	7	4	0.02
Sarpang	-	-	-
Thimphu	418	315	6.22
Trashigang	44	44	1.07
Trashi Yangtse	4	4	0.14
Trongsa	138	88	1.31
Tsirang	495	315	4.47
Wangdue Phodrang	432	254	3.81
Zhemgang	107	69	0.98
Bhutan	**3,792**	**2,160**	**40.76**

Table A7.05 Persimmon production by *dzongkhag*, 2021

Dzongkhag	Persimmon		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	27	9	0.00
Chukha	73	25	0.75
Dagana	250	68	1.49
Gasa	-	-	-
Haa	27	16	0.16
Lhuentse	701	179	2.55
Mongar	738	460	7.61
Paro	210	177	11.89
Pema Gatshel	198	106	1.70
Punakha	1,379	870	23.66
Samdrup Jongkhar	186	105	2.01
Samtse	35	23	0.15
Sarpang	-	-	-
Thimphu	204	76	2.29
Trashigang	441	312	5.62
Trashi Yangtse	322	220	4.01
Trongsa	296	136	4.93
Tsirang	353	55	0.35
Wangdue Phodrang	1,231	721	25.21
Zhemgang	288	151	3.08
Bhutan	**6,961**	**3,712**	**97.48**

Table A7.06 Walnut production by *dzongkhag*, 2021

Dzongkhag	Walnut		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	957	429	6.53
Chukha	931	131	3.85
Dagana	1,148	241	9.34
Gasa	2	-	-
Haa	764	374	5.17
Lhuentse	1,992	783	16.50
Mongar	1,434	512	13.30
Paro	1,470	933	13.28
Pema Gatshel	689	211	4.06
Punakha	1,122	593	12.53
Samdrup Jongkhar	2,543	454	9.23
Samtse	265	-	-
Sarpang	306	9	0.00
Thimphu	1,073	618	8.51
Trashigang	2,684	1,307	29.22
Trashi Yangtse	1,123	704	13.33
Trongsa	1,111	234	3.88
Tsirang	760	71	0.87
Wangdue Phodrang	878	308	4.06
Zhemgang	4,808	797	25.02
Bhutan	**26,061**	**8,708**	**178.68**

Table A7.07 Lemons and lime production by *dzongkhag*, 2021

Dzongkhag	Lemons and Lime		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	1,303	509	3.62
Dagana	1,726	850	18.43
Gasa	-	-	-
Haa	51	33	0.37
Lhuentse	61	49	1.10
Mongar	327	155	1.91
Paro	-	-	-
Pema Gatshel	1,963	863	7.62
Punakha	592	330	2.82
Samdrup Jongkhar	3,107	2,663	13.56
Samtse	3,389	2,062	56.25
Sarpang	2,962	1,675	13.54
Thimphu	9	9	0.02
Trashigang	59	34	0.15
Trashi Yangtse	37	16	0.26
Trongsa	119	66	0.99
Tsirang	2,021	915	11.66
Wangdue Phodrang	440	295	3.55
Zhemgang	408	195	3.29
Bhutan	**18,575**	**10,718**	**139.14**

Table A7.08 Hazelnut production by *dzongkhag*, 2021

Dzongkhag	Hazelnut		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	20,278	356	0.08
Chukha	14,696	-	-
Dagana	27,220	54	0.08
Gasa	-	-	-
Haa	7,187	-	-
Lhuentse	54,085	4,687	3.98
Mongar	51,028	16,612	4.55
Paro	496	-	-
Pema Gatshel	72,462	13,435	0.34
Punakha	4,374	111	0.22
Samdrup Jongkhar	128,409	-	-
Samtse	-	-	-
Sarpang	8	4	0.00
Thimphu	4,845	138	0.45
Trashigang	181,077	17,132	2.14
Trashi Yangtse	19,925	8,293	1.16
Trongsa	8,800	37	0.01
Tsirang	37,323	20	0.09
Wangdue Phodrang	10,367	561	0.71
Zhemgang	24,134	373	0.37
Bhutan	**666,716**	**61,814**	**14.20**

Table A7.09 Mango production by *dzongkhag*, 2021

Dzongkhag	Mango		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	2,113	580	9.45
Dagana	8,773	4,332	92.05
Gasa	-	-	-
Haa	38	-	-
Lhuentse	368	209	2.67
Mongar	5,888	2,803	69.38
Paro	-	-	-
Pema Gatshel	14,015	4,632	71.19
Punakha	1,283	769	11.87
Samdrup Jongkhar	8,945	3,134	41.40
Samtse	6,033	1,426	35.95
Sarpang	7,930	2,631	43.75
Thimphu	-	-	-
Trashigang	2,508	923	25.35
Trashi Yangtse	1,130	462	7.57
Trongsa	1,136	221	5.82
Tsirang	6,777	3,021	72.80
Wangdue Phodrang	762	229	3.59
Zhemgang	6,056	2,522	37.68
Bhutan	**73,755**	**27,892**	**530.52**

Table A7.10 Guava production by *dzongkhag*, 2021

Dzongkhag	Guava		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	2,490	1,853	39.53
Dagana	6,964	5,893	149.27
Gasa	-	-	-
Haa	164	95	1.04
Lhuentse	541	486	9.39
Mongar	3,520	2,438	30.04
Paro	-	-	-
Pema Gatshel	5,952	4,251	50.64
Punakha	5,317	4,572	72.92
Samdrup Jongkhar	4,585	3,545	63.52
Samtse	3,908	2,642	52.26
Sarpang	4,667	3,500	47.59
Thimphu	-	-	-
Trashigang	1,315	1,144	17.45
Trashi Yangtse	811	781	11.51
Trongsa	2,416	1,780	38.62
Tsirang	8,176	6,904	156.70
Wangdue Phodrang	1,236	1,033	24.29
Zhemgang	4,040	2,947	58.88
Bhutan	**56,101**	**43,864**	**823.64**

Table A7.11 Pomegranate production by *dzongkhag*, 2021

Dzongkhag	Pomegranate		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	278	61	0.44
Dagana	1,472	762	13.87
Gasa	-	-	-
Haa	-	-	-
Lhuentse	366	258	3.59
Mongar	606	350	4.46
Paro	57	35	0.59
Pema Gatshel	991	331	2.83
Punakha	709	430	7.16
Samdrup Jongkhar	811	489	3.93
Samtse	282	159	0.67
Sarpang	417	174	0.83
Thimphu	62	24	0.40
Trashigang	240	144	2.53
Trashi Yangtse	196	159	1.99
Trongsa	227	157	3.03
Tsirang	2,114	972	12.38
Wangdue Phodrang	513	193	2.63
Zhemgang	294	106	1.47
Bhutan	**9,634**	**4,804**	**62.82**

Table A7.12 Avocado production by *dzongkhag*, 2021

Dzongkhag	Avacado		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	1,695	93	1.42
Dagana	9,655	585	5.32
Gasa	-	-	-
Haa	264	14	0.05
Lhuentse	981	94	1.14
Mongar	8,809	1,367	16.25
Paro	-	-	-
Pema Gatshel	6,313	622	6.22
Punakha	2,299	430	5.97
Samdrup Jongkhar	6,741	338	2.27
Samtse	2,751	155	2.83
Sarpang	5,409	233	3.33
Thimphu	-	-	-
Trashigang	2,519	288	2.80
Trashi Yangtse	369	31	0.76
Trongsa	2,015	176	2.66
Tsirang	10,956	1,022	11.49
Wangdue Phodrang	1,789	130	1.16
Zhemgang	9,360	977	9.80
Bhutan	**71,926**	**6,555**	**73.46**

Table A7.13 Litchi production by *dzongkhag*, 2021

Dzongkhag	Litchi		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	2,270	885	24.01
Dagana	4,770	2,413	38.94
Gasa	-	-	-
Haa	-	-	-
Lhuentse	-	-	-
Mongar	884	155	1.55
Paro	-	-	-
Pema Gatshel	5,834	1,136	11.81
Punakha	36	12	0.32
Samdrup Jongkhar	4,537	1,325	24.71
Samtse	7,690	2,666	54.15
Sarpang	15,535	9,802	211.09
Thimphu	-	-	-
Trashigang	48	36	0.25
Trashi Yangtse	-	-	-
Trongsa	19	13	0.95
Tsirang	2,663	655	11.63
Wangdue Phodrang	22	4	0.02
Zhemgang	3,116	1,039	11.21
Bhutan	**47,424**	**20,140**	**390.64**

Table A7.14 Jackfruit production by *dzongkhag*, 2021

Dzongkhag	Jackfruit		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	341	122	7.02
Dagana	1,161	388	72.38
Gasa	-	-	-
Haa	-	-	-
Lhuentse	5	3	0.06
Mongar	92	41	5.64
Paro	-	-	-
Pema Gatshel	2,243	552	41.62
Punakha	29	15	0.95
Samdrup Jongkhar	882	383	41.70
Samtse	757	525	68.11
Sarpang	1,025	626	66.37
Thimphu	-	-	-
Trashigang	12	2	0.45
Trashi Yangtse	5	-	-
Trongsa	203	26	7.98
Tsirang	652	206	12.31
Wangdue Phodrang	25	2	0.05
Zhemgang	774	379	40.96
Bhutan	**8,208**	**3,272**	**365.60**

Table A7.15 Banana production by *dzongkhag*, 2021

Dzongkhag	Banana		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	41,965	14,557	207.60
Dagana	89,915	42,095	521.65
Gasa	-	-	-
Haa	2,752	1,628	15.76
Lhuentse	5,448	2,680	23.83
Mongar	33,732	11,357	100.91
Paro	-	-	-
Pema Gatshel	39,990	10,057	176.59
Punakha	3,926	1,443	12.41
Samdrup Jongkhar	46,220	10,211	164.58
Samtse	60,740	25,615	318.10
Sarpang	102,554	33,425	398.94
Thimphu	2	-	-
Trashigang	10,459	4,112	43.00
Trashi Yangtse	9,133	4,003	23.55
Trongsa	9,935	6,019	71.28
Tsirang	164,173	79,594	842.94
Wangdue Phodrang	4,645	2,688	23.57
Zhemgang	32,141	14,023	228.92
Bhutan	**657,730**	**263,506**	**3,173.64**

Table A7.16 Tree tomato production by *dzongkhag*, 2021

Dzongkhag	Tree Tomato		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	1,844	1,632	14.38
Dagana	4,907	4,231	42.77
Gasa	-	-	-
Haa	650	523	3.33
Lhuentse	3,463	3,205	35.38
Mongar	3,884	3,205	26.20
Paro	3	-	-
Pema Gatshel	2,171	1,805	10.48
Punakha	8,810	8,045	161.29
Samdrup Jongkhar	1,130	954	7.82
Samtse	759	706	4.74
Sarpang	6,064	5,509	31.80
Thimphu	-	-	-
Trashigang	1,227	1,094	11.79
Trashi Yangtse	1,050	896	9.48
Trongsa	2,302	1,660	18.12
Tsirang	14,236	11,259	68.24
Wangdue Phodrang	1,851	1,621	16.37
Zhemgang	2,786	2,261	21.97
Bhutan	**57,138**	**48,605**	**484.17**

Table A7.17 Papaya production by *dzongkhag*, 2021

Dzongkhag	Papaya		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	72	56	1.98
Dagana	1,989	1,363	38.90
Gasa	-	-	-
Haa	-	-	-
Lhuentse	11	8	0.17
Mongar	829	575	8.12
Paro	-	-	-
Pema Gatshel	653	447	8.66
Punakha	164	109	2.03
Samdrup Jongkhar	955	640	11.54
Samtse	813	513	10.48
Sarpang	2,638	2,057	28.50
Thimphu	-	-	-
Trashigang	72	66	1.70
Trashi Yangtse	114	105	2.12
Trongsa	427	337	5.78
Tsirang	2,759	2,106	40.01
Wangdue Phodrang	42	34	0.35
Zhemgang	260	147	3.76
Bhutan	**11,800**	**8,562**	**164.08**

Table A7.18 Pineapple production by *dzongkhag*, 2021

Dzongkhag	Pineapple		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	6,316	2,680	2.71
Dagana	40,830	15,648	26.89
Gasa	-	-	-
Haa	99	10	0.01
Lhuentse	9	-	-
Mongar	10,727	6,987	12.80
Paro	-	-	-
Pema Gatshel	67,526	37,166	41.20
Punakha	-	-	-
Samdrup Jongkhar	19,365	7,163	8.34
Samtse	20,936	11,047	11.48
Sarpang	31,153	18,125	15.50
Thimphu	-	-	-
Trashigang	1,942	1,320	1.77
Trashi Yangtse	11	8	0.01
Trongsa	107	84	0.14
Tsirang	3,580	2,057	3.46
Wangdue Phodrang	-	-	-
Zhemgang	8,201	2,703	3.89
Bhutan	**210,802**	**104,999**	**128.19**

Table A7.19 Passion fruit production by *dzongkhag*, 2021

Dzongkhag	Passion fruit		
	Total Tree	Bearing Tree	Production (MT)
Bumthang	-	-	-
Chukha	239	189	3.69
Dagana	415	310	5.77
Gasa	-	-	-
Haa	126	112	1.22
Lhuentse	139	115	1.43
Mongar	185	119	1.59
Paro	-	-	-
Pema Gatshel	468	328	5.30
Punakha	80	44	0.78
Samdrup Jongkhar	452	317	4.86
Samtse	181	154	3.61
Sarpang	413	299	4.10
Thimphu	-	-	-
Trashigang	36	25	0.29
Trashi Yangtse	54	15	0.17
Trongsa	35	35	0.27
Tsirang	1,138	755	12.84
Wangdue Phodrang	78	45	0.22
Zhemgang	1,211	283	4.94
Bhutan	**5,251**	**3,144**	**51.09**

QUESTIONNAIRE

དཔལ་ལྡན་འབྲུག་གཞུང་།
རྒྱལ་ཡོངས་སྐྱོས་དཔྱད་བཀོད་འཛིན།

Royal Government of Bhutan
National Statistics Bureau

2021 AGRICULTURE SURVEY

སྤྱི་ལོ་ ༢༠༢༡ ལོ་ནམ་བཟུང་ཞིབ།

All information collected in this questionnaire will strictly remain confidential

MODULE A: HOUSEHOLD IDENTIFICATION

Dzongkhag:	Prefilled
Gewog:	Prefilled
Chiwog:	Prefilled
Village:	
Sample Household Number:	Prefilled
Respondent's name:	
Contact Number of the HH:	
House Number:	
Thram Number:	
Tap to record GPS:	
Tap to record Date of the Interview	

MODULE B: CEREAL

Did your household grow any [CEREAL] in this *gewog* in 2021?

[1] Yes

[2] No (>>Did your households grow any [CEREAL] in another *gewog* in 2021?)

What CEREAL did you grow in this *Gewog* in 2021? Please select all that apply

[1] Paddy Irrigated

[2] Paddy Upland (Kam Bja/Pang bara)

[3] Maize (Geza/Aashum/Makai)

[4] Wheat (Ka/Bong)

[5] Barley (Nay/Femong)

[6] Millet (Memja/Kongpu/Kodoko/Yangra)

[7] Buckwheat (Bjo/Khala/Jarey/Guntshon)

[8] Quinoa

Area sown of [CEREAL NAME] in DECIMAL

Area lost of [CEREAL NAME] in DECIMAL

Quantity of [CEREAL NAME] produced in KG

Did your household grow any [CEREAL] in another *gewog* in 2021?

[1] Yes

[2] No (>>Did your households grow any [CEREAL] in yet another *gewog* in 2021?)

Which *Dzongkhag*?

Which *Gewog*?

Which *Chiwog*?

What CEREAL did you grow in another *Gewog* in 2021? Please select all that apply

[1] Paddy Irrigated

[2] Paddy Upland (Kam Bja/Pang bara)

[3] Maize (Geza/Aashum/Makai)

[4] Wheat (Ka/Bong)

[5] Barley (Nay/Femong)

[6] Millet (Memja/Kongpu/Kodoko/Yangra)

[7] Buckwheat (Bjo/Khala/Jarey/Guntshon)

[8] Quinoa

Area sown of [CEREAL NAME] in DECIMAL [1] Yes	
Area lost of [CEREAL NAME] in DECIMAL	
Quantity of [CEREAL NAME] produced in KG	
Did your household grow any [CEREAL] in yet another *gewog* in 2021?	
[1] Yes	
[2] No (>>Did your households sell any [CEREAL] in 2021?)	
Which *Dzongkhag*?	
Which *Gewog*?	
Which *Chiwog*?	
What CEREAL did you grow in yet another *Gewog* in 2021? Please select all that apply	
[1] Paddy Irrigated	
[2] Paddy Upland (Kam Bja/Pang bara)	
[3] Maize (Geza/Aashum/Makai)	
[4] Wheat (Ka/Bong)	
[5] Barley (Nay/Femong)	
[6] Millet (Memja/Kongpu/Kodoko/Yangra)	
[7] Buckwheat (Bjo/Khala/Jarey/Guntshon)	
[8] Quinoa	
Area sown of [CEREAL NAME] in DECIMAL [1] Yes	
Area lost of [CEREAL NAME] in DECIMAL	
Quantity of [CEREAL NAME] produced in KG	
Did your household sell any [CEREAL] in 2021?	
[1] Yes	
[2] No (>>module c-Oilseeds)	
What CEREAL did you sell in 2021? Please select all that apply	
[1] Paddy Irrigated	
[2] Paddy Upland (Kam Bja/Pang bara)	
[3] Maize (Geza/Aashum/Makai)	
[4] Wheat (Ka/Bong)	
[5] Barley (Nay/Femong)	
[6] Millet (Memja/Kongpu/Kodoko/Yangra)	
[7] Buckwheat (Bjo/Khala/Jarey/Guntshon)	
[8] Quinoa	
Total quantity of [CEREAL NAME] sold in KG	
Total quantity of [CEREAL NAME] sold from home in KG	
Rate per KG of [CEREAL NAME] sold from home	

MODULE C: OILSEEDS

Did your household grow any [OILSEEDS] in 2021?

[1] Yes

[2] No (>>Did your households sell any [OILSEEDS] in 2021?)

What OILSEEDS did you grow in 2021? Please select all that apply

[1] Mustard (Pyka/Memba/Yungka)

[2] Sunflower (Nima meto/Gum phul)

[3] Soybean (Lebee/Bhatamas)

[4] Groundnut (Badam)

[5] Perilla (Naam/Selam)

Area sown of [OILSEEDS NAME] in DECIMAL

Area lost of [OILSEEDS NAME] in DECIMAL

Quantity of [OILSEEDS NAME] produced in KG

Did your household sell any [OILSEEDS] in 2021?

[1] Yes

[2] No (>>module D-Pulses)

What OILSEEDS did you sell in 2021? Please select all that apply

[1] Mustard (Pyka/Memba/Yungka)

[2] Sunflower (Nima meto/Gum phul)

[3] Soybean (Lebee/Bhatamas)

[4] Groundnut (Badam)

[5] Perilla (Naam/Selam)

Total quantity of [OILSEEDS NAME] sold in KG

Total quantity of [OILSEEDS NAME] sold from home in KG

Rate per KG of [OILSEEDS NAME] sold from home

MODULE D: PULSES

Did your household grow any [PULSES] in 2021?

[1] Yes

[2] No (>>Did your households sell any [PULSES] in 2021?)

What PULSES did you grow in 2021? Please select all that apply

[1] Rajma beans (Mashaam)

[2] Mung beans (Gakpu/Shakpu/Kalo dhaal)

[3] Lentil (Mussori dhaal)

[4] Beans dry (Semchung kham/Oray sangma)

Area sown of [PULSES NAME] in DECIMAL

Area lost of [PULSES NAME] in DECIMAL

Quantity of [PULSES NAME] produced in KG

Did your household sell any [PULSES] in 2021?

[1] Yes

[2] No (>>module E-Vegetables)

What PULSES did you sell in 2021? Please select all that apply

[1] Rajma beans (Mashaam)

[2] Mung beans (Gakpu/Shakpu/Kalo dhaal)

[3] Lentil (Mussori dhaal)

[4] Beans dry (Semchung kham/Oray sangma)

Total quantity of [PULSES NAME] sold in KG

Total quantity of [PULSES NAME] sold from home in KG

Rate per KG of [PULSES NAME] sold from home

MODULE E: VEGETABLES

Did your household grow any [VEGETABLES] in 2021?

[1] Yes

[2] No (>>Did your households sell any [VEGETABLES] in 2021?)

What VEGETABLES did you grow in 2021? Please select all that apply

[1] Asparagus (Ngyakhagchu)		[11] Garlic leaves (Chagop dama/Lasun pata/Lamshaba)	
[2] Beans Green/fresh (Semchum)		[12] Gourd (Khatem/olachoto/Lauka/Kairu)	
[3] Brinjal (Dolom/Bando/Baigun)		[13] Green leaves (Hoentsey/Sag/Spinach/Paiga)	
[4] Broccoli		[14] Peas Green/fresh (Mator/Changma/Baisem)	
[5] Onion Bulb (Gop/Pyaz/Gogpa)		[15] Pumpkin (Kakur/Brumsha/Pharshee)	
[6] Bunching Onion/spring onion (Dong Gop dama)		[16] Radish (Laphu/Mula)	
[7] Cabbages (Banda Kopi)		[17] Squash (Baekha/Escus)	
[8] Carrot (Laphu Maap/Gajar)		[18] Tomato (Lambenda)	
[9] Cauliflower (Metokopi/Phool kopi)		[19] Turnip (Endo/Donai)	
[10] Chili (all type)		[20] Beetroot	

Area sown of [VEGETABLES NAME] in DECIMAL

Area lost of [VEGETABLES NAME] in DECIMAL

Quantity of [VEGETABLES NAME] produced in KG

Did your household sell any [VEGETABLES] in 2021?

[1] Yes

[2] No (>>module F-Spices)

What VEGETABLES did you sell in 2021? Please select all that apply

[1] Asparagus (Ngyakhagchu)		[11] Garlic leaves (Chagop dama/Lasun pata/Lamshaba)	
[2] Beans Green/fresh (Semchum)		[12] Gourd (Khatem/olachoto/Lauka/Kairu)	
[3] Brinjal (Dolom/Bando/Baigun)		[13] Green leaves (Hoentsey/Sag/Spinach/Paiga)	
[4] Broccoli		[14] Peas Green/fresh (Mator/Changma/Baisem)	
[5] Onion Bulb (Gop/Pyaz/Gogpa)		[15] Pumpkin (Kakur/Brumsha/Pharshee)	
[6] Bunching Onion/spring onion (Dong Gop dama)		[16] Radish (Laphu/Mula)	
[7] Cabbages (Banda Kopi)		[17] Squash (Baekha/Escus)	
[8] Carrot (Laphu Maap/Gajar)		[18] Tomato (Lambenda)	
[9] Cauliflower (Metokopi/Phool kopi)		[19] Turnip (Endo/Donai)	
[10] Chili (all type)		[20] Beetroot	

Total quantity of [VEGETABLES NAME] sold in KG

Total quantity of [VEGETABLES NAME] sold from home in KG

Rate per KG of [VEGETABLES NAME] sold from home

MODULE F: SPICES

Did your household grow any [SPICES] in 2021?

[1] Yes

[2] No (>>Did your households grow any [CARDAMOM] in another *gewog* in 2021?)

What [SPICES] did you grow in 2021? Please select all that apply

[1] Cardamom (Alanchi)

[2] Ginger (Saga/Aduwa)

[3] Turmeric (Yongka/Haldi)

[4] Garlic bulb (Chagop/Lasun)

[5] Coriander (Yuse/Daneya)

[6] Sichuan Pepper (Timbur/Thingey/Ghee)

Area sown of [SPICES NAME] in DECIMAL

Area lost of [SPICES NAME] in DECIMAL

Quantity of [SPICES NAME] produced in KG

Did your household grow any [CARDAMOM/GINGER] in another *gewog* in 2021?

[1] Yes

[2] No (>>Did your households sell any [CARDAMOM/GINGER] in 2021?)

Which *Dzongkhag*?

Which *Gewog*?

Which *Chiwog*?

Area sown of [CARDAMOM/GINGER] in DECIMAL

Area lost of [CARDAMOM/GINGER] in DECIMAL

Quantity of [CARDAMOM/GINGER] produced in KG

Did your household sell any [SPICES] in 2021?

[1] Yes

[2] No (>>module G-Roots and Tuber)

What [SPICES] did you sell in 2021? Please select all that apply

[1] Cardamom (Alanchi)

[2] Ginger (Saga/Aduwa)

[3] Turmeric (Yongka/Haldi)

[4] Garlic bulb (Chagop/Lasun)

[5] Coriander (Yuse/Daneya)

[6] Sichuan Pepper (Timbur/Thingey/Ghee)

Total quantity of [SPICES NAME] sold in KG

Total quantity of [SPICES NAME] sold from home in KG

Rate per KG of [SPICES NAME] sold from home

MODULE G: ROOTS AND TUBER

Did your household grow any [ROOTS AND TUBER] in 2021?

[1] Yes

[2] No (>>Did your households grow any[ROOTS AND TUBER] in another *gewog* in 2021?)

What [ROOTS AND TUBER] did you grow in 2021? Please select all that apply

[1] Potato (Pasong/Kaeva/Alu)

[2] Sweet Potato (Kaeva-Ngarm/Sakar khanda/Yengorong)

[3] Cassava_Tapioca (Shingjoktang/Deyshe-Kaeva/Semal tarul)

[4] Taro_Yautia_Collocasia (Bozong/Daw/Piralu)

[5] Ground apple

Area sown of [ROOTS AND TUBER NAME] in DECIMAL

Area lost of [ROOTS AND TUBER NAME] in DECIMAL

Quantity of [ROOTS AND TUBER NAME] produced in KG

Did your household grow any [ROOTS AND TUBER] in another *gewog* in 2021?

[1] Yes

[2] No (>>Did your households sell any[ROOTS AND TUBER] in 2021?)

Which *Dzongkhag*?

Which *Gewog*?

Which *Chiwog*?

Area sown of [ROOTS AND TUBER] in DECIMAL

Area lost of [ROOTS AND TUBER] in DECIMAL

Quantity of [ROOTS AND TUBER] produced in KG

Did your household sell any [ROOTS AND TUBER] in 2021?

[1] Yes

[2] No (>>module H-Fruits)

What [ROOTS AND TUBER] did you sell in 2021? Please select all that apply

[1] Potato (Pasong/Kaeva/Alu)

[2] Sweet Potato (Kaeva-Ngarm/Sakar khanda/Yengorong)

[3] Cassava_Tapioca (Shingjoktang/Deyshe-Kaeva/Semal tarul)

[4] Taro_Yautia_Collocasia (Bozong/Daw/Piralu)

[5] Ground apple

Total quantity of [ROOTS AND TUBER NAME] sold in KG

Total quantity of [ROOTS AND TUBER NAME] sold from home in KG

Rate per KG of [ROOTS AND TUBER NAME] sold from home

MODULE H: FRUITS

Did your household grow any [FRUIT TREE] in 2021?

[1] Yes

[2] No (>>Did your households have any [FRUIT TREE] in another *gewog* in 2021?)

What [FRUIT TREES] did you have in 2021? Please select all that apply

[1] Apple		[14] Mango (Amchukoli/Am say/Amp)	
[2] Apricot (Kham chungku)		[15] Papaya (Modhufala/Mewa)	
[3] Areca nut (Doma/Guwae)		[16] Passion Fruit (Jaga chup/Zargong/Garanda)	
[4] Avacado (Zhungge Gule/Baruwa)		[17] Peach (Kham/lengsey/Aru)	
[5] Banana (Ngala/Lai say/Kala)		[18] Pear (Lee/Lee tong/Naspati)	
[6] Dragon fruit (Gewaringpa/Gyelwaringa)		[19] Persimmon (Aunday)	
[7] Guava (Bebpasue/Ambak)		[20] Pineapple (Jana congtse/Anaras)	
[8] Hazelnut (Hazay)		[21] Plum (Choolee/Say-choorpu/Ambagara)	
[9] Jackfruit (Damsay/Dremleng/Kathar)		[22] Pomegranate (Chindu/Thalemsey)	
[10] Kiwi (Zhempaykotong)		[23] Tree tomato (Rup tomato/Shing lambenda)	
[11] Lemons and Limes (Kapoor zaymo/Limbu)		[24] Walnut (Tago/Khey say/Okhar)	
[12] Litchi		[25] Watermelon (Apa guto/Kharay muza) (>>Area sown/lost)	
[13] Mandarin (Tshelu/Soontala)		[26] Cucumber (Goenchu/Mangpung/Kakra) (>>Area sown/lost)	

Area sown of [FRUIT NAME] in DECIMAL

Area lost of [FRUIT NAME] in DECIMAL

Total number of [FRUIT NAME] trees

Bearing number of [FRUIT NAME] trees

Quantity of [FRUIT NAME] produced in KG

Number of [FRUIT NAME] bearing trees lost

Did your household have any [FRUIT TREE] in another *gewog* in 2021?

[1] Yes

[2] No (>>Did your households sell any [FRUIT] in 2021?)

Which *Dzongkhag*?

Which *Gewog*?

Which *Chiwog*?

What [FRUIT TREES] did you have in 2021? Please select all that apply

[1] Apple		[14] Mango (Amchukoli/Am say/Amp)	
[2] Apricot (Kham chungku)		[15] Papaya (Modhufala/Mewa)	
[3] Areca nut (Doma/Guwae)		[16] Passion Fruit (Jaga chup/Zargong/Garanda)	
[4] Avacado (Zhungge Gule/Baruwa)		[17] Peach (Kham/lengsey/Aru)	
[5] Banana (Ngala/Lai say/Kala)		[18] Pear (Lee/Lee tong/Naspati)	
[6] Dragon fruit (Gewaringpa/Gyelwaringa)		[19] Persimmon (Aunday)	
[7] Guava (Bebpasue/Ambak)		[20] Pineapple (Jana congtse/Anaras)	
[8] Hazelnut (Hazay)		[21] Plum (Choolee/Say-choorpu/Ambagara)	
[9] Jackfruit (Damsay/Dremleng/Kathar)		[22] Pomegranate (Chindu/Thalemsey)	
[10] Kiwi (Zhempaykotong)		[23] Tree tomato (Rup tomato/Shing lambenda)	
[11] Lemons and Limes (Kapoor zaymo/Limbu)		[24] Walnut (Tago/Khey say/Okhar)	
[12] Litchi		[25] Watermelon (Apa guto/Kharay muza) (>>Area sown/lost)	
[13] Mandarin (Tshelu/Soontala)		[26] Cucumber (Goenchu/Mangpung/Kakra) (>>Area sown/lost)	

Total number of [FRUIT NAME] trees	
Bearing number of [FRUIT NAME] trees	
Quantity of [FRUIT NAME] produced in KG	
Number of [FRUIT NAME] bearing trees lost	

Did your household sell any [FRUITS] in 2021?

[1] Yes

[2] No (>>Tap to record EndTime)

What [FRUIT] did you sell in 2021? Please select all that apply

[1] Apple		[14] Mango (Amchukoli/Am say/Amp)	
[2] Apricot (Kham chungku)		[15] Papaya (Modhufala/Mewa)	
[3] Areca nut (Doma/Guwae)		[16] Passion Fruit (Jaga chup/Zargong/Garanda)	
[4] Avacado (Zhungge Gule/Baruwa)		[17] Peach (Kham/lengsey/Aru)	
[5] Banana (Ngala/Lai say/Kala)		[18] Pear (Lee/Lee tong/Naspati)	
[6] Dragon fruit (Gewaringpa/Gyelwaringa)		[19] Persimmon (Aunday)	
[7] Guava (Bebpasue/Ambak)		[20] Pineapple (Jana congtse/Anaras)	
[8] Hazelnut (Hazay)		[21] Plum (Choolee/Say-choorpu/Ambagara)	
[9] Jackfruit (Damsay/Dremleng/Kathar)		[22] Pomegranate (Chindu/Thalemsey)	
[10] Kiwi (Zhempaykotong)		[23] Tree tomato (Rup tomato/Shing lambenda)	
[11] Lemons and Limes (Kapoor zaymo/Limbu)		[24] Walnut (Tago/Khey say/Okhar)	
[12] Litchi		[25] Watermelon (Apa guto/Kharay muza) (>>Area sown/lost)	
[13] Mandarin (Tshelu/Soontala)		[26] Cucumber (Goenchu/Mangpung/Kakra) (>>Area sown/lost)	

Total quantity of [FRUIT NAME] sold in KG	
Total quantity of [FRUIT NAME] sold from home in KG	
Rate per KG of [FRUIT NAME] sold from home	
Tap to record EndTime	


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