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**Himalayan College of Agricultural Sciences and Technology  
(HICAST)  
Purbanchal University affiliate**

**HICAST RESEARCH ABSTRACT S, 2016, volume 6**

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## FOREWORD

Himalayan College of Agricultural Sciences and Technology (HICAST) has been conducting academic programmes in affiliation with Purbanchal University since 2000. Both the bachelor and master degree students must conduct field- and/or laboratory-based research, write and submit thesis based on research findings as partial requirement for obtaining the degree the student is enrolled to. Without being properly and timely published, these research findings cannot reach to wider readership, and continue to remain as decorative materials in the book shelves of the library. Realizing the importance of widely circulating at least the abstracts of those researches an attempt was initiated by us to publish the thesis research abstracts annually.

This publication is a collection of abstracts of 60 thesis researches conducted in 2015. This is the sixth volume of this journal. Relevant thesis can be consulted at HICAST Library for more information.

This volume has seven chapters, viz. agri-economics and business management, horticulture, plant breeding, plant protection, sustainable agriculture, veterinary science, and dairy / meat technology.

I would like to acknowledge all the organisations (GOs, I/NGOs, POs) and HICAST for providing financial as well as other support to the intern students for conducting these researches in various parts of the country. I would also like to thank all graduates of HICAST who sincerely and successfully accomplished their research responsibilities. I also acknowledge all the faculties and scientists who supervised HICAST students to conduct these researches.

It is hoped that the publication will be useful for the students, researchers, teachers, policy makers and development workers. It is the publication that each student of agriculture and veterinary science should possess and read.

1 November 2016  
Kathmandu



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Binayak P Rajbhandari, PhD  
Executive Chairperson

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## **1. AGRI-ECONOMICS AND AGRI-BUSINESS MANAGEMENT**

### **VALUE CHAIN ANALYSIS OF GERBERA CUT FLOWER IN KATHMANDU VALLEY OF NEPAL**

**Deepa Bhattarai and Rajendra P. Bhari**

Value chain approach is an important tool to maximize profitability through value share, mutual benefits and consumer satisfaction in flower business. The main objective of this study was to assess the value chain of gerbera cut flower in Kathmandu Valley of Nepal. Household survey was conducted during January to March, 2014 A.D. Randomly selected 30 respondents including producers, wholesalers and retailers from Bhaktapur, Kathmandu and Lalitpur Districts were interviewed. Average area under gerbera was found 0.2 Ha. Average cost of cultivation and production was NRs. 154332 per ropani and NRs 4.43 per stick respectively. Average gross return from gerbera cut flower was NRs 321660.70 per ropani / year. Better crop management, grading, storage, packaging, decoration and floral arrangement were recorded as major value addition activities. Total cost including losses, storage, transportation, grading and packaging of gerbera in value chain to a producer, wholesalers and retailers was NRs. 6.23, 10.37 and 13.81 per stick respectively. On an average profit margin to producer was NRs 2.46 per stick followed by retailer (NRs 2.37) and wholesaler (NRs 1.08). It has shown that the share in total benefit to producers and retailers was almost equal (41.54, 40.13percent respectively) in gerbera value chain. The highest level of value addition was at producers' level followed by retailers among several stakeholders in gerbera value chain. Governmental organizations, N/INGOs, FAN, AEC, ADBL and Banks, farmers' groups and projects were identified as supporting and enabling organizations in the value chain of gerbera. Input Suppliers, Producers, Wholesalers, Exporters, Importers, Retailers and Consumers were major actors. Though government played vital role in extension, input, transport and market management and regulations, governmental support was still noted inadequate on subsidies, trainings, extension, marketing infrastructure development and post harvest technology. Thus, government should harmonize their policy for the promotion of value chain in gerbera business.

### **MARKETING DYNAMICS OF VEGETABLE CROPS IN DARCHULA DISTRICT OF NEPAL**

**Bipin Shrestha and Raj Kumar Adhikari**

Vegetable is the most promising and profitable agriculture enterprises to improve rural livelihood through income generation and self employment in Nepal. The main objective of this study was to assess the marketing dynamics of vegetables in

Darchula district of Nepal. Household survey was conducted during 7<sup>th</sup> March 2015 to 1<sup>st</sup> June 2015. Randomly selected 90 respondents including producers, wholesalers and retailers from Boharigaun, Rithachaupata and Gokuleshor VDCs of Darchula District were interviewed. The average area under vegetable was 36.27 percent of total used land area. Tomato, potato, cabbage and cauliflower were identified as the major vegetables produced in commercial scale across the study areas. The average cost of tomato, cabbage, cauliflower, and potato production across the study areas was found NRs. 5.91, 6.93, 27.55 and 19.95 per Kg respectively. On an average B: C of vegetable enterprise was found 3.74 whereas the commodity wise B:C ratio of different vegetables such as tomato, cabbage, cauliflower and potato was found 5.45, 1.25, 1.50 and 1.55 respectively. Similarly, on an average gross margin of tomato, cabbage, cauliflower and potato was found NRs. 127711, 12011.40, 15694 and 19245 per Ropani respectively. The marketing margin of tomato, cabbage, cauliflower and potato across the study sites was found NRs. 10.23, 3.83, 8.17 and 6.78 per kg respectively. There was four types of marketing channels exist in the study areas. However, Producers to Consumers and producers to retailers to consumers was identified as the most common and vibrant channel for vegetable flowing across the study areas. Among several problems, attack of disease and insect pest were the major problems of vegetable production and lack of packaging material and processing facility was the major marketing problems. Therefore, benefit can be optimized through commercialization of vegetable farming, for this government should harmonize their policy to develop appropriate production technologies and extension facilities as well as marketing infrastructure and timely and quality input supply in the rural areas of the country.

**BENEFIT COST ANALYSIS OF TOMATO CULTIVATION UNDER  
PLASTIC TUNNEL TECHNOLOGY IN PERI-URBAN AREAS OF  
KATHMANDU VALLEY**

**Pradip Gautam and Rajendra P. Bhari**

Study entitled “Benefit Cost Analysis of Tomato Cultivation under Plastic Tunnel Technology in Peri-Urban Areas of Kathmandu Valley” was carried out during February to July 2015. The main objective of the study was to analyze the benefit and cost of tomato production under plastic tunnel in peri-urban areas of Kathmandu valley. Thirty farmers randomly selected from different areas of Kathmandu, Lalitpur and Bhaktapur districts were interviewed with the help of pre-tested questionnaire. Socio-demographic studies revealed that more number of male farmers (70 %) was found to be involved in tomato production under plastic tunnel as compared to female (30 %). Agriculture was found as major occupation (80 %) of the sample farmers. Average family size was found 4.58 with land holding size of 0.23 ha.

Economic analysis showed that tomato production was a highly beneficial enterprise. This was justified by the higher (2.78) Benefit/Cost ratio of tomato production under the plastic tunnel. Another financial indicator the Break Even Point (BEP) of tomato production was estimated to be 21.25 percent, indicating lesser risk in this business. On an average cost of production, gross return and net profit per hectare per year, was estimated to be NRs 6, 20,954.95, NRs.17, 16,000.47 and NRs. 10,95,045.05 respectively. The average tomato production per hectare per year was estimated to be 51,780.34 kg. Most of the farmers used to sell their products to wholesale market (37 %). Major advantages from the tomato cultivation under plastic tunnel were easy technique for off season production, increase in production and income during off-season. Along with managerial problems; higher initial cost, and higher occurrence of disease were found as major problems in the tomato in the study area. Therefore, the government and concerned agencies are suggested to provide support needed to overcome these problems.

### **ECONOMICS OF MUSHROOM PRODUCTION IN KHALANGA, RUKUM**

**Shreekrishna Gautam and Surendra Subedi**

The study entitled **Economics of Mushroom Production in Khalanga, Rukum** was conducted during February to July, 2015 to perform the economics of mushroom production in Khalanga, Rukum. In the study area (Khalanga), thirty respondents had been selected by using simple random sampling technique way who grow oyster mushroom either in a group or individually and information on mushroom production was collected by using the both open and closed ended structured questionnaire method as well as the desk study method and the data thus obtained were analyzed by the simple statistical tools as well as the simple tables, charts and graphs also. The mushroom production was found to be a profitable as well as a women friendly agricultural profession which played important as well as positive role on the socio-economic status of the respondents. An average total cost of production as well as the gross return from production was Rs. 27,597 and Rs. 76,440 respectively resulted in average net return Rs. 48,843. On an average, about 392 kg of oyster mushroom was produced by each farmer from the hundred straw balls. An average B/C ratio was 2.77. There was perfect market where only one intermediary i.e. retailers involved in the marketing channels of mushroom. It could easily be grown by the sampled respondents with minimum efforts which gave them quick and good profit. Even though the mushroom production was profitable as well as women friendly agricultural profession for low income rural households, the farmers faced some problems and constraints related to production, technical, and marketing as well as awareness regarding the mushroom production. At last, by improving mushroom production techniques, establishing standard procedure,

adoption of mushroom cooperative farming as well as diversification on produced mushroom should be suggested in order to increase value addition as well as agricultural profession sustainability in the long run helps to obtain the optimum return from the mushroom production.

### **GROWTH TREND AND MARKETING OF RAINBOW TROUT FARMING ENTERPRISE IN NUWAKOT DISTRICT**

**Manila Maharjan and Kiran Raj Joshi**

Rainbow Trout (*Onchorynchus my kiss*) farming among farmers has been popular in hills of Nepal. Trout farming in private sector was started first in Nuwakot district since 1998/99 by the help of technical support from Fishery Research Centers, Trishuli and Godavari. This study was conducted during 16<sup>th</sup> February 2015 to 12<sup>th</sup> March 2015. Primary data about Trout production, Trout entrepreneurs and marketing were collected from household survey, and relevant secondary data were collected from related institution. The main objective of this study was to encourage the local entrepreneurs through Rainbow Trout Farming Enterprise in Nuwakot District. In 2056 there was only 1 farmer and it has increased to 38 in 2071. This increase in numbers of Trout farmers in Nuwakot district showed that it was high profitable business. Presently the total pond area covered by Trout farming is 7774.07 m<sup>2</sup>. The different parameters (like total raceways pond, total area occupied by the ponds, total pond capacity area, total marketable Trout produced, total fingerling produced and total revenue collected) used for the study of growth trend of Trout enterprise of Trout farming from the year 2010/11 to 2014/15. The marketable size of Rainbow Trout was (200-300) g. The average farm gate price of price of trout was found to be NRs.1200 per kg (fresh fish) and NRs. 1500 per kg (cooked fish). There was high demand for the Trout as compared to the production. The benefit cost ratio (B/C ratio) of the Trout farms of the big Trout farmers is 1.99 and that of the small farmers is 1.82. The B/C ratios greater than 1 indicate that the farms of both the big and small farmers were financially profit. The cost of production of Rainbow trout for area of 125 sq m, benefit cost ratio was found to be 1.3 which indicated about the economic viability and marketing potential of the enterprise that enhanced the livelihood of the Trout farming household/ communities.

### **SOCIO-ECONOMIC IMPACT OF VEGETABLE SEED PRODUCTION AND ITS MARKETING POTENTIALITIES IN RUKUM DISTRICT**

**Nabin K. Sharma and Pradhyumna Raj Panday**

This study was conducted in Rukum district of Nepal to assess the Socio- Economic Impact of Vegetable Seed Production and Its Marketing Potentialities during 10 January to 30 July 2015. For house hold survey 5 village development committees

(VDC) namely Khalanga, Sangkha, Chhibang, Kholaghau, Nuwakot were purposively selected. A total 50 households were selected randomly (10 house hold from each VDC). It was found that among the total 50 respondents of the study area 58 percent were male and 42 percent were female. The majority of the population had acquired secondary level of education (38 %). The majority of the population (58 %) had agriculture as major occupation. It was found that all ethnic groups of respondents were involved in vegetable seed production. Brahmin and Chhetri (58 %) were the major population involved in vegetable seed production followed by Janajati (34 %). The average land holding under vegetable seed production of surveyed household was 0.181 hectare out of total 0.357 hectare of land. Total 20 percent respondents were received training related to vegetable seed production and marketing. It was found that, technical knowledge, non-availability of inputs materials, inadequate irrigation facilities, transportation and road facilities, delay payment by collector, monopoly of the single contractor and high market margin, inadequate price information, lack of proper storage and processing plant were the major problems faced by the farmer. The study of economic analysis of vegetable seed production revealed that the B: C ratio of radish seed , onion seed, cauliflower seed and rayo seed were 1.58, 1.74, 1.66, and 1.69 respectively. Other economic measures analysis was also done. The most preferred marketing channel in this area was found to producer (Farmer) – Seed assembler (local Trader, local cooperative) – seed processor (seed company) – Consumer. Study found that after cultivating vegetable seed respondent were able to increase their income 2-4 times from the same land by selling vegetable seed. It is hoped that this information will be useful for policy maker and farmers for the selection of profitable enterprise.

### **COMPARATIVE STUDY OF OPEN STOCK AND CAGE FISH FARMING IN PHEWA LAKE, POKHARA, NEPAL**

**Apeksha Subedi and Kamal Raj Gautam**

The per capita fish consumption is very low, only 1676 g/person/year and fish has been contributing about 10% of animal protein consumption in people's diet, due to production is limited to inland fisheries and resource poor aquaculture in Nepal. Captive aquaculture and cage fisheries have the greatest potential for increasing fish production in Nepal. The main objective of this study was to compare open stock fish farming and cage culture in Phewa Lake. About 200 households of "Jalari" are spread over around the Pokhara valley and nearly 91 families living along the Phewa Lake, depending on cage aquaculture and fishing for their livelihoods. Many projects and several research works as well as study programs were carried out to achieve the goal of livelihoods improvement of Jalaris during past years. Now improved livelihoods of Jalaris seems an example of successful cage aquaculture under a participatory and co-management approach with collaboration of fisher's community

and establishment of Harpan Phewa Matshya Sahakari (Khapaudi). Now, the Lakes of Pokhara valley are highly threatened by over exploitation, silt deposition and environmental degradation. Major environmental problems of Phewa Lake are sedimentation, eutrophication and heavy infestation of water hyacinth. The total cage number counted was 615 with volume 25208.85 m<sup>3</sup> in Phewa Lake during the study. The mean holding of nursery cage by individual's farmers was 74.77 m<sup>3</sup> having three numbers and production cage was 216.01 m<sup>3</sup> having five numbers. The silver and Bighead carp cultured in Polyculture gave mean productivity of 6.1 (kg/m<sup>3</sup>/yr) and range was 2.43 to 7.29 kg/m<sup>3</sup>/yr. The grass carp cultured in monocultures mean productivity was 6.89 kg/m<sup>3</sup>/yr and range was 4.25-10.2 kg/m<sup>3</sup>/yr. Average cost of production was calculated Rs.56.85 per kg for caged fish. In case of catch fish cost of production was not calculated because artificial feeding is also not provided and during breeding season fishes breed naturally so no major supply of fry and fingerlings according to Jalaris. Total sale of 2848.475kg catch fish was done during study period and Rs.87610.00 was gross return to the cooperative from total sales. In case of cage fish, 335.2kg was sold and gross return of Rs.3530 was made. Growth Performance was also observed in different breeds, however caged fish showed better performance although the season was off period for fish production.

### **CONSUMERS WILLINGNESS TO PAY ON ORGANIC VEGETABLE IN KATHMANDU VALLEY**

**Kranti Rai and Raj Kumar Adhikari**

The study on "Consumers' willingness to pay on organic vegetables in Kathmandu valley" was carried out from January 25 to July 2015 to know the extra price consumers were willing to pay for organic vegetables as compared to general vegetables. The Kathmandu valley was selected as study site because the organic consumers as well as organic shops and farms are more in Kathmandu valley rather than other cities of Nepal. One hundred consumers were randomly selected for interview with a semi structured questionnaire. Out of 100 consumers, 50 respondents were organic growers and 50 were general consumers. The data obtained were analyzed using MS Excel and mean, frequency and percentage were calculated. The study revealed that the organic consumers were willing to pay 30 percent more price for uncertified organic vegetables and 31 percent more price for certified organic vegetables. While the general consumers were willing to pay 19 percent more extra price for uncertified organic vegetables and 20 percent more extra price for certified organic vegetables. It was found that the organic consumers were usually permanent residents and highly educated than general vegetable consumers. Both the organic and general consumers were willing to buy the organic vegetables regularly. But there were not enough number organic shops and higher price had also

been the problem. The certification process was not common in organic shops but consumers preferred to buy certified organic vegetables. Based on the result of the study some suggestions are made for the organic vegetables problems among consumers and sellers.

**A STUDY ON PROCESSING, MARKETING AND EXPORT  
POTENTIALITY OF ORGANIC COFFEE  
IN LALITPUR DISTRICT**

**Basanta Adhikari and Kamal Raj Gautam**

A study was conducted at Chandanpur and Thuladurlung Village Development Committees (VDC) in Lalitpur district on processing, marketing and export potentiality of organic coffee. This study was performed in Dec 2014 to July 2015. For data collection a simple questionnaire was used. A total of 70 respondent farmers and 1 processing unit were selected for interview. For marketing and export information, 1 processor and 1 trader were interviewed. Coffee is one of the important cash crops in the mid hills of Nepal. Being an important high value crops, coffee is mostly grown in marginal lands with minimum use of improved technologies. In line with the focus of agricultural policies, the concerned agencies have not taken adequate initiatives for the promotion of coffee cultivation. In Nepal majority of coffee was wet processed, which is considered best method for good quality coffee. However, there was lack of trained manpower and improved technologies. As a result, quality of Nepalese coffee is below international standard. Around 65 percent of Nepalese coffee is exported and the rest amount was processed and supplied in the domestic market. Majority of coffee was exported through personal contact of traders rather than through institutionalized marketing channel.

**SOCIO-ECONOMIC IMPACT OF STRENGTHENING SMALLHOLDER  
ENTERPRISE PROJECTS WITH RESPECT TO WOMEN EMPOWERMENT  
(A STUDY OF KUNATHARI VDC OF SURKHET)**

**Nikita Sapkota and Pradhyumna Raj Panday**

The study entitled “Socio-economic impact of strengthening smallholder enterprise project with respect to women empowerment of Kunathari VDC of Surkhet”. The research was carried out in Kunathari VDC of Surkhet district to find out the impact of the project on the rural livelihood, women empowerment, and capital formation. The study had covered the Heifer trained women as well as women involved in the self help group. The study was conducted during the month of January to July in 2015. Using the descriptive and analytical research design with simple random sampling technique altogether 60 beneficiaries from the different wards of the VDC

was sampled for the survey. The study revealed that, women were able to generate annual income of Rs. 24750, which had helped for their daily and other expenses. On the other hand, the goat enterprise seemed to be in profit showing B/C ratio of 1.67 and annual net income of Rs. 26150. The enterprise had experienced constraints for taking into commercial mode due to lack of technology, financial support and occurrence. The local women should be encouraged to produce the livestock on the commercial scale for this the major problems that are seen should be addressed and disease tolerant breeds should be selected for distributed and properly managed. As the resource poor women couldn't manage higher number of goat they should be supported for housing and grazing land.

### **ASSESSMENT OF MARKETING OF MAJOR VEGETABLE SEEDS IN KATHMANDU VALLEY**

**Sharmila Phuyal and Nanu Jha**

The general objective of the study was assess marketing of major vegetable seeds in Kathmandu valley and to probe with the objectives a semi-structured survey was conducted with 30 vegetable seed traders. The duration of the project was from December, 2014 to February, 2015. The results of the objectives were analyzed by using some simple statistical tools such as semi-structured questionnaire survey, direct observations, reports and publications of the concerning agencies and review of literatures. Vegetable seeds were produced on contract basis with farmers based on the demand. Produced seeds were collected, transported, processed, packaged and stored by traders/ companies, and distributed to wholesalers or retailers for selling to the consumers. The costs were incurred in consumer price from seed procurement, collection to distribution and up to sale to wholesalers and retailers. Major seeds marketed were French bean (27.45 %), radish (16.35 %) and cauliflower (12.92 %) including both seeds produced within the country and imported. The producer's share in consumer's rupee in channel I for French bean (63 %), radish (68%) and cauliflower (59 %) were higher than in channel II which was 68 percent, 71 percent, and 64 percent, respectively. The margin of profit to retailer was Rs. 30-35/kg which was higher than that of company and wholesaler. The cost incurred from collection to distribution in per kg seeds were, transportation cost Rs. 10. The marketing costs in channel I and II were Rs. 80/kg and Rs 65/kg, respectively. It was due to involvement of 3 intermediaries in channel I and 2 intermediaries in channel II. Likewise, several constraints faced by wholesalers and retailers were lack of information regarding the labeling of the packets, seed processing and storage, high cost for hybrid seeds, complicated regulation, high demand for hybrid seed by consumers, and political instability. Therefore, hybrid seed development program should be placed in first priority for the development of seed industry in the country.

It has been suggested that public and private seed sector companies and traders should consider consumer's demand and choice first, and make marketing of vegetable seeds more effective and efficient in the country.

## **2. HORTICULTURE**

### **ESTIMATION OF POST HARVEST LOSSES OF FRUIT AND VEGETABLE AT MAJOR WHOLESALE MARKETS IN KATHMANDU**

**Sabin Panthi and Santaman Shayka**

A study was conducted during January- February, 2015 to estimate the post harvest losses at three major wholesale markets in Kathmandu namely Kalimati Fruits and Vegetables Wholesale Market, Balkhu Vegetables Wholesale Market and Kuleshwor Fruits Wholesale Market. The survey of Kalimati market consisted of 30 traders (20 vegetables and 10 fruits traders) whereas; Balkhu and Kuleshwor markets had 20 and 10 traders respectively. The maximum postharvest loss in Kalimati was in cauliflower(18%) followed by cabbage (13.75%), banana (13%) and grape (9%).The maximum postharvest losses in Balkhu were in potato and tomato (14% in each) followed by cauliflower (12%) and cabbage (11%). The maximum postharvest loss at Kuleshwor was in papaya (20%) followed by grape (9.5%). The major causes of postharvest losses were lack of cold storage facilities, inappropriate packaging and poor handling, lack of grading system, inappropriate transport system and poor quality of the products. These causes need to be addressed and over supply of fruits and vegetables should be avoided to minimize the postharvest losses.

### **A STUDY ON POST HARVEST STATUS OF MANDARIN UNDER DIFFERENT PACKAGING MATERIALS TREATMENTS**

**Roshan Shah and Bishnu P. Bhattarai**

The experiment was conducted from March 9 to April 23 2015 AD to study on the post harvest status of mandarin (*citrus reticulata*) under different packaging materials treatments. Five treatments, plastic (20 micron) wrapping (T<sub>1</sub>), plastic (20 micron) with 5 holes wrapping (T<sub>2</sub>), plastic (20 micron) with 10 holes wrapping (T<sub>3</sub>), Newspaper wrapping (T<sub>4</sub>), Jute wrapping (T<sub>5</sub>), no packaging materials (control) (T<sub>6</sub>) with three replication were used. Physical attributes including shelf life, weight loss, color index, pathological disorder and marketability were observed in every three days. In the study T<sub>2</sub> was found best. This provides suitable environment for gaseous exchange and lowers transpiration and moisture loss rate and increases shelf life of fruits. The maximum shelf life (45 days) was recorded in T<sub>2</sub>. Weight loss was maximal in T<sub>6</sub> followed by T<sub>4</sub> and T<sub>5</sub>. The color change was rapid in T<sub>1</sub> followed by

T<sub>3</sub> and T<sub>6</sub>. T<sub>1</sub> and T<sub>3</sub> were severely affected by the pathogens causing greenish color in the samples. Marketability was higher in T<sub>2</sub> up to 42 days from storage followed by T<sub>4</sub> and T<sub>5</sub>.

**PRODUCTION TECHNIQUES, PROBLEMS AND MARKETING OF ONION  
IN BANKE DISTRICT**

**Pawan K. Khadka and G.K Shrestha**

A study entitled production techniques, problem and marketing of onion was conducted at Bageshwori, Khajura and Kamdi Village Development Committee (VDC) in Banke district .This study was performed from Dec 2014 to Feb 2015, using simple pre-tested questionnaire. A total of 100 respondent farmers were selected and interviewed for data collection. Onion is one of the important cash generative crops in the Terai belt of Nepal. Agriculture was the main occupation of majority of the respondent whose literacy rate was (62%). In the study area most of the respondents were cultivated Nasik variety which is 61 percent. 86 percent of respondents were taken nearby local market. The main problems were irrigation, purple blotch diseases 38 % affected by these diseases. Main market centers are Khajura, Nepalgunj and Kolhapur.In marketing, male population was involvement 54%.Onion is deficient during Bhadra to Falgun, when its price is high and it is mostly imported from India to meet the demand. Farmers should be aware about the knowledge and skill on onion production, pests and disease management as well as marketing. Farmers onion late harvest due to lack of storage facility and absence of organized marketing resulting to sale in lower price. Trainings and support should be provided to all farmers involved in onion cultivation and farmers should be encouraged to cultivate improved variety and support program should be done accordingly

**POST HARVEST PRACTICES OF STRAWBERRY AND ITS ROLE IN  
INCOME GENERATION IN NUWAKOT DISTRICT**

**Prithvi Mahat and Bishnu P. Bhattarai**

"Post-Harvest Practices of Strawberry (*Fragaria* spp.) and its role in income generation in Nuwakot District" was carried out in two VDCs (Okharpauwa and Kakani), during 15<sup>th</sup> Jan 2015 to 15<sup>th</sup> July 2015 by using semi-structured questionnaire. The study included 100 farmers involved in strawberry farming. The main objective of the study was post-harvest practices of strawberry and its role in income generation in local level farmer in Nuwakot district. Majority of the farmers grew strawberry in less than 0.5 ha of land. Literacy rate was 52.58 percent and remaining 47.42 percent were illiterate in study area. Regarding the gender involvement, 52.5

percent male and 47.5 percent female workers were directly involved in harvesting activity. Similarly 50.83 percent of female and 49.17 percent of male workers were involved in processing activity of strawberry industry in selected area. Jam, Jelly, Wine, and Juice were the major strawberry products .But among them strawberry wine was major products. Strawberry farming had provided employment opportunity to the members of each family in every season. After the involvement in strawberry farming, the farmers had improved their livelihood status, food security, health status of the family, child education and annual saving. Total average annual income generated by strawberry growers was NRs 99100.

### **OFF-SEASON VEGETABLE PRODUCTION AND ITS ROLE IN INCOME AND EMPLOYMENT GENERATION IN MYAGDI DISTRICT**

**Niraj Mishra and Bishnu P. Bhattarai**

The present study on “Off-season vegetable production and its role in income and employment generation in Myagdi district” was carried out in three VDCs (Bima, Darbang and Babiachaur). Study was conducted during January to May, 2015. All together 100 respondents were selected for survey. Among them 35 respondents were from Bima VDC, 35 respondents were from Darbang VDC and remaining 30 respondents were from Babiachaur VDC. The reason behind choosing the off-season vegetable production was due to its higher net return per unit area per unit time than the cereals and normal season vegetables. Farmers produce different types of off-season vegetables among which tomato, cauliflower and pumpkin were the major one by which they have boosted their economic condition. The farmers of three different VDCs engaged in off-season vegetable were 52.40 percent male and 47.60 percent were female respondents. Eighty four percent of the respondents were found to be literate and 16 percent of the respondents were illiterate. The age group between 36-45 years was found to be maximal in the study area. Majority of the respondents had total land holding of 0.2-0.3 ha for off-season vegetable production. Farmers had their own land for off-season vegetable production while some had taken land in rent for the production of off-season vegetables. The income generated from off-season vegetable was more than Rs.30,000 per 0.05 ha. The employment of male was 45 percent and female was found to be 55 percent. Home manpower was 43.2 percent and outsider manpower was found to be 56.8 percent.

**A STUDY ON POSTHARVEST LOSSES OF CAULIFLOWER (*Brassica oleracea* var *botrytis*) IN OKHALDHUNGA DISTRICT**

**Keshav Rokaya and Dinesh Shrestha**

The present study “A Study on Post harvest losses of cauliflower (*Brassica oleracea* var *botrytis*)” was undertaken in the lab of Rumjatar Higher Secondary School, Rumjatar, Okhaldhunga, Nepal from 20<sup>th</sup> February, 2015 to 20<sup>th</sup> March 2015. Shelf life, weight loss, color index, pathological disorders and marketability were studied out with different packaging materials namely, Polybag covering (20 micron) (T<sub>1</sub>), polybag covering with 10 holes (T<sub>2</sub>), Polybag covering with 20 holes (T<sub>3</sub>), Newspaper wrapping (T<sub>4</sub>), Jute wrapping (T<sub>5</sub>), Leaf covering (T<sub>6</sub>) and without packaging material (control) (T<sub>7</sub>). Each treatment had five replications. The study was carried out in the randomized complete block design under ambient room temperature and relative humidity. Cauliflower was the selected object for this study. Longest shelf life (28 days) was observed in Newspaper wrapping (T<sub>4</sub>) and the shortest shelf life (18 days) was observed in polybag wrapping (20 micron) (T<sub>1</sub>) and polybag wrapping with 10 holes (T<sub>2</sub>). Shelf life of 26 days was observed in the Jute covering (T<sub>5</sub>) and leaf covering (T<sub>6</sub>) treatments whereas 20 days shelf life was observed in polybag covering with 20 holes (T<sub>3</sub>) and control (T<sub>7</sub>). Weight loss was maximum in T<sub>7</sub> followed by T<sub>4</sub>. The color change was rapid in T<sub>7</sub>. T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were severely affected by the pathogens and minimal pathological disorders were found in T<sub>4</sub> followed by T<sub>5</sub> and T<sub>6</sub> causing brownish and blackish color in the samples. Marketability was higher in T<sub>4</sub> up to 30 days from storage followed by T<sub>5</sub> and T<sub>6</sub>.

**ASSESSMENT OF LIVELIHOOD AND FOOD SECURITY OF MARGINALISED COMMUNITIES ADOPTING BIO-INTENSIVE VEGETABLE FARMING IN SIRAHA DISTRICT**

**Santosh Bist and Namita Nepal**

The main objective of the study “was to reveal the livelihood and food security of marginalized community adopting bio-intensive vegetable farming in Siraha district“. The study was conducted from 10<sup>th</sup> of January to 10<sup>th</sup> of July 2015 by applying interview technique. Three VDCs that were Padhariya, Govindpur, Dhangadhi and one municipality Bastipur were taken as study site. Among marginalized community major source of income to sustain their livelihood and food security was agriculture (48%) and remittance (28%). Raising livestock like goat, cattle and buffalo was another income source helps to contribute in poverty alleviation, self-employment and income generation to improve their livelihood and food security status. Out of 54 percent of male population 29.7 percent people were actively engaged in BIF and out of 46 percent of female 36.8 percent were involved

in BIF. In the study area farmers adopting bio-intensive farming used to sell the vegetables, cereals, pulses and cash crops and used that income to fulfill their basic requirements. Crop production was found to be very low because of drought and poor irrigation facility. Sixteen percent of respondents households hardly had food sufficiency for whole year and only twenty one percent of households had food security up to 3 months from their own production. Diseases/pests have been adversely affecting the crop yields in the study area. They had not adopted any effective measures to manage them. In addition, the technical assistance and support provided by NGO and INGO had enabled them to practicing BIFS to increase production from their small land. The support program of WOREC within the framework of BIF had contributed for achieving its positive impact on their livelihoods and food security.

## **STUDY ON FRUIT MARKETING SITUATION IN KATHMANDU VALLEY**

**Umesh Paudel and Sita Bantha Magar**

“Study on Fruits Marketing Situation in Kathmandu Valley” was conducted with the objective of assessing the future fruit market potentiality and strategies in Kathmandu valley. This study covered wholesale markets, supermarkets, retail shops and street vendors in Kathmandu valley and was done from March to April, 2015 using research tools such as questionnaire interview, key informant discussion and direct observation, and review of literatures. Wholesalers, supermarkets, fruit retail shop operators, street vendors and consumers were respondents of this study. Women’s participation was found dominated in street vending but Madheshi community’s, mainly men, involvement, was higher in fruit wholesaling and bicycle vending. Supermarkets were fetching the higher price due to their special packaging systems and good appearance whereas the retail shops and street vendors did not have any packaging systems. The wholesale and retail price of the various fruit commodity was increasing in every year. There was demand and supply of apple, pomegranate and banana all round the year in all kinds of fruit markets. The yearly supply of orange in the Kathmandu valley was highest (that is 6525900 Kg) followed by Mango (1402205 Kg), apple (1391270 Kg) and Papaya (958750Kg) in 2014/15. Daily sales of fresh fruit commodity by street vendors was slightly greater than that of retail shops because of the mobility of street vendors in different street and they sold their fruits commodity in cheaper price than that of retail shops. The major source of fruit marketed in retails shops were Kalimati and Balkhu fruits and vegetable wholesale market. If the production of the fruits is done in a more commercial manner all round the year in Nepal, then there is a huge fruit market potentiality in Kathmandu valley.

**PRODUCTION TECHNIQUES, PROBLEMS AND MARKETING OF  
POTATO IN BANKE DISTRICT**

**Keshav Chalaune and G.K Shrestha**

Potato is a major food crop, grown in more than 100 countries in the world. According to FAO (2008), potato is consumed by more than one billion people in the world. The potato is considered as the king of vegetable. The market demand of the potato and area under cultivation is increasing day by day. This study was conducted in Bageshwori, Khajura Khurd and Kamdi VDCs of Banke District during January to March 2015 to study the “Production Techniques, Problems and Marketing of Potato” The main objective of this study was to assess the production techniques, problems and marketing of potato in Banke District of Nepal. It was done by using a set of pre-tested questionnaire. The sample size included 105 Households. Out of this 35 respondents were taken from each VDC. Agriculture was the main occupation of majority respondents of the study area where literacy rate was 42 percent. The problems of irrigation, the incidence of potato late blight and red ant were high in Kamdi where damage by frost was high as well main market centers were Khajura, Nepalganj and Kohalpur. Farmers were doing late harvesting due to lack of storage facility and absence of organized marketing that resulted in lower price. Government agency was found lagging behind to provide proper training to the potato growers and facilitate them to have access to improved variety of seed tuber. It has been suggested that trainings and support should be provided to all farmers involved in potato cultivation; and the farmers should be encouraged to cultivate improved variety.

**MARKETING OPPORTUNITIES AND STRATEGIES FOR INTEGRATED  
PEST MANAGEMENT (IPM) GROWN PRODUCE IN KASKI AND  
SYANGJA DISTRICTS**

**Ajay Pratap Giri and Bishnu P. Bhattarai**

The present survey on “Marketing Opportunities and Strategies for Integrated Pest Management (IPM) Grown Produce” was conducted in Kaski and Syangja districts. The general objective of the survey was to assess the market opportunities for IPM grown produce and to develop strategy to improve the existing markets. The method of survey was mainly focused on collecting data by directly interviewing targeted groups such as farmers, consumers, traders and agro-vet owners through random selection. So, the study was carried out for 6 months from January 2015 to June 2015. During the survey 4 VDC’s namely Lumle, Dhikurpokhari, Dhital and Lahachowk; and 1 sub-metropolitan namely Pokhara of the Kaski District and 2 VDC’s namely Jagatbhanjyang and Chhangchhangdi; and 1 municipality namely

Waling of Syangja District were studied. The total sample size was 330 consisting of 50 farmers, 100 consumers, 10 traders and 5 agro-vets from each districts. From the survey, it was found that the price of the produce was mainly fixed by negotiation between the parties but farmers were not getting any regularity of premium price. The cost of production of IPM farming in comparison to conventional farming was found to be almost similar but not expensive. Farmers were attracted towards IPM approaches because of the low pesticide exposure and sustainability of their agricultural land. Majority of consumers was concerned about the health effects of pesticide residues on produce and would prefer to purchase the produce grown using IPM approach. Moreover, consumers were willing to pay premium in price

### **3. PLANT BREEDING**

#### **EVALUATION OF FLOOD TOLERANT RICE GENOTYPES**

**Subash Thapa and Pallavi Singh**

This study on “Evaluation of flood tolerant rice genotypes” was conducted at Khailad VDC of Kailali district from June 2014 to July 2015 at local farmer field. Random block design was implemented replicating each variety for 5 times. Fifty plants for each variety including 5 replications were averaged. The data were analysed using XLSTAT 2015. It was conducted to know feasibility of submergence tolerance variety and its output to promote rice yield and elevate food insecurity at rainy season. The study showed that genetically improved rice varieties like Sworna sub-1 and Samba Mansuli Sub-1 can increase rainy season rice production than previously popular Sarju-52 and commercial non modified Mansuli rice. The government of Nepal must show their concern on improvement of rice varieties to utilize every part to fulfill food security.

#### **ON-FARM CHARACTERIZATION AND DIVERSITY ASSESMENT OF OILSEED CROPS IN KANCHANPUR DISTRICT**

**Jayant Pd. Bhatt and Bal Krishna Joshi**

Oilseed crop was grown was from the ancient period in Nepal. Among the oilseed crops, lahi and tori is grown by majority of farmers of Kanchanpur district. In this district a lot of inter and intra-species diversity was observed in major, minor and high potential oilseed crops. A study was carried out on on-farm characterization and diversity assessment of oilseed crops in Kanchanpur, Nepal from 27th December 2014 to 13th May 2015. Basically characterized and diversity assigned data of landraces has been found important to monitor the dynamics of oilseed crops genetic resource management. A total of 15 rapeseed grower farmers were taken for on-farm characterization of oilseed crops by using Standard descriptor of IBPGR (Rome 1991). The species richness, evenness, or dominance of landraces was estimated using diversity indices. A lot of diversity was observed both in qualitative and quantitative traits. The variability of plant height ranges from (74.4-167.6 cm) Lahi and (121.6-224 cm) tori, leaf length (4.6-15.4 cm) lahi and (8.4-20.2 cm) tori, leaf width (2.4-11.7 cm) silique length (3.2-4.6 cm) lahi and (2.4-3.8 cm) tori, beak

length (14.8-18.6 mm) lahi and (6.4-13.2 mm) tori, number of seed per silique (8.4-10 seeds) lahi and (8.6-10.4 seeds) tori, 1000 grains test weight (2.1-2.6 gm) lahi and (2.5-2.7) tori. Diversity in both qualitative and quantitative traits was studied in rapeseed. It was concluded that oilseed crops found in on-farm of the Kanchanpur district indicted maximum diversity which can be used for improvement of oilseed cultivars (especially rapeseed) for specific purpose. Moreover molecular study of these samples should be done which gives reliable information and should focus on documentation and conservation of other landraces from the place which are never explored.

### **CHARACTERIZATION AND DIVERSITY ASSESSMENT OF NEPALESE WHEAT**

**Sanket Kattel and Bimal K. Baniya**

A study on Characterization and diversity assessment of Nepalese wheat was conducted at National Agriculture Genetic Resource Center, Khumaltar, Nepal from 28th November to 28th May 2015 to study phenotypic variation and estimate diversity among Nepalese wheat accessions. A total of 393 wheat landraces were taken for characterization of using Standard descriptor of IBPGR 1985. Sowing was done in different dates starting from 17th November 2014 to 11th December 2014 and each plots of size 1m\*0.5m were arranged with no replication from where data were taken from randomly selected five plants. A lot of diversity was observed both in qualitative and quantitative traits. The variability of plant height ranges from (50.4-141.2 cm), spike length (6.18-12.8 cm), spike breadth (5.61- 13.43), 1000 seed weight (19.09-71.96 gm), grain yield (0.125-0.975 Kg), growth habit of young plant (263 upright and 30 prostrate), tillering capacity ranging from low(3) to high (7), spike density ranging from very lax to very dense, glume color was dominated by red to brown, awnedness was dominated by awned, glume hairiness was dominated by low glume hairiness, intermediate seed size was found dominated, seed color was dominated by white color. Scoring of wheat landraces against rust showed that most of the accessions were resistant to moderately resistant to rust. Diversity in quantitative traits was found more than the qualitative traits determined by Shannon weaver diversity index. Correlation among traits showed direct effect and linear relationship. It was concluded that Nepalese wheat present maximum diversity which can be used for improvement of wheat cultivars for specific purpose. There was recent need of their detail study in the same environment they occurs, more over molecular study of these genotypes should be done which gives reliable information and should focused on documentation and conservation of other landraces from the place which are never explored.

**EVALUATION OF ADVANCED LENTIL LINES THROUGH  
COORDINATED VARIETAL TRIAL (CVT) AT KHUMALTAR, LALITPUR**

**Upendra Dahal and Pallavi Singh**

A research study was carried out in Agro-Botany Division of NARC in Khumaltar Nepal from Nov.8 2014 to Apr 5<sup>th</sup> 2015 in order to evaluate the advanced lentil genotypes from different genetic accessions of the crop, where 7 traits of 18 genotypes of lentil accessions with four replications were studied. This research illustrated that genotypes like LN-0136, ILL-311, Sagun and Shital took more days to flower, genotypes like WBL-77, LG-12, PL-4 and ILL-3490. It was found that Black Masuro PL-4 and Sagun had the highest maturity days, on contrary to LN-0136, RL-79. Yield was recorded highest in genotypes like ILL-6467, ILL- 3111, ILL-3490 in comparison to Black Masuro, PL-4, ILL-7979 and ILL-2712. Thousand seed weight was found higher in genotype WBL-77, ILL-7715 than in Shital, ILL-3111 and RL-4. Plant height was observed taller in genotypes like RL-4, ILL-7979, ILL-7163, than in Black Masuro, ILL-7715 and Sagun. This research illustrated that LG-12 RL-4 and Shital had more pods per plant than genotypes like LN-0136, Black Masuro, ILL-3490 and ILL-7715. Finally RL-4, ILL-6819 and RL-79 had greater number of branches than genotypes like LN-0136, Sagun, Hul-57 and ILL-7163. Statistically significant difference was observed in traits like Days to flowering, Days to maturity, Plant height and Pod per plant where that was not observed in Yield, Branches and Thousand seed weight. Highest CV was observed in Yield (40%) and lowest in Days to flowering, (3.2%). Thus the study suggested that genotypes like ILL-6467, ILL-3490, ILL-3111 and LN-0136 were advanced lentil genotypes based on Yield. RL-79, LN-0136, WBL-77 and ILL-6819 were the advanced lentil genotypes based on Days to Maturity. RL-4, ILL-7979, ILL-7163 and LG-12 were advanced lentil genotypes based on Plant height, where tall type genotypes were considered superior.

**EVALUATION OF LENTIL (*Lens culinaris*) GERMPLASM ON THE BASIS  
OF AGRO-MORPHOLOGICAL CHARACTERIZATION IN KHUMALTAR,  
LALITPUR**

**Jharana Upadhyaya and Pallavi Singh**

A research was carried out to evaluate the performance of 16 lentils (*Lens culinary*) germplasm on the basis of agro-morphological characterization. The data on fourteen quantitative and nine qualitative traits were studied. ANOVA table revealed that significant variation was found among the genotypes for the traits early stand, plant height, disease severity, chlorophyll content of leaf, 1000 seed weight and protein

content. Grain yield was highly positively correlated with DTM, plant height, pod per plant, branch per plant, seed per pod, chlorophyll content of leaf and also positively correlative with DTF and protein content. This research illustrate that genotypes Shital, ILL-4605, RL-4, and ILL-7715 took less days to flowering and genotypes ILL-4605, PL-4, Sagun, Shital, ILL7715, and ILL-8006 took less days to maturity similarly, genotypes sagun, RL-12 and Simal showed taller plant height whereas, genotypes ILL-3490 ,HUL-57, RL-6, Khajura-2, and Sagun had low susceptible to disease. Higher pod per plant was recorded in genotypes Sagun, RL-12, Khajura-2 and RL-4 similarly, average chlorophyll content of leaf was found higher in genotypes ILL-7164 and ILL-8006. Thousand seed weight was higher in genotypes ILL-4605, PL-4 and RL-6. Similarly, grain yield was found higher in genotypes Sagun, RL-6, RL-12 and Khajura -2. Higher protein content was found in genotype RL-6, ILL-8006 and ILL- 3490. Among ground color of testa gray color and among cotyledon color orange are more preferred by farmer. Genotype Sagun, RL-12, Khajura-2, RL-4, ILL-3490, ILL-8006 showed better performance in this trial.

#### **CHARACTERIZATION OF INDIGENOUS WHEAT CULTIVARS AT NORTHERN BELT OF DHADING DISTRICT**

**Keshav K. Bista and Bimal K. Baniya**

Wheat (*Triticum aestivum* L) is one of the most important stable cereal crops of Nepal which is grown in lowland of Terai to high hills. A study of wheat cultivar was conducted in Northern belt of Dhading at Tripureshwor-2 Khahare, Phulkharka-8 Kalleri, Phulkharka-5 Paiyankharka at an altitude of 800, 1200 and 1600 masl respectively from 30<sup>th</sup> November 2014 to 26<sup>th</sup> May 2015. Characterization was done using standard descriptor of IBPGR 1985. To study the agro-morphological variability of two indigenous wheat cultivars at three level of altitude, data were collected from 20 plots of each 3 sites for 9 quantitative and 9 qualitative traits at farmer's field. A lot of intra and inter variability was observed in quantitative traits and not much difference was observed in qualitative traits. In all three sites, the variability was very high in plant height, spike length and tillers per plant respectively. Variability of plant height ranges from 44.48-108.45 cm, spike length 5.41-11.35 cm, tillers/hill 2-3, plants /plot 43-99, germination 12-20 days, heading 45-131 days, flowering 66-139 days, maturity 90-161 days, 1000 seed weight 69.85-91.36 gm, growth habit 7 prostrate, growth class 1 winter, tillering capacity 3 low, spike density 7 dense -9 very dense, glume color 2 red to brown, awnedness 3 awnletted, seed color 1 white- 2 amber, seed size 5 intermediate- 7 large, degree of shrivelling 5 intermediate- 3 plump. It is concluded that both rato gahun and seto gahun are more useful in breeding program in developing other varieties. There is

need to study this population in control condition for more traits and molecular study is needed for more reliable information.

### **A STUDY ON SIMPLE SEQUENCE REPEAT (SSR) PROFILING OF MAIZE LANDRACES**

**Janak Rawat and Bal Krishna Joshi**

A study on SSRs Profiling of Maize (*Zea mays*) Landraces was conducted in Genebank, NARC, Khumaltar from January to July 2015. Twenty three Maize accessions were collected from Genebank, NARC, Khumaltar. Five Primers were used in this study to know the genetic diversity of maize. In this studies there were details information given about DNA extraction and basic techniques in PCR, agarose gel electrophoresis. DNA was extracted from different accessions with the help of CTAB method. DNA amplification was carried out in Thermal cyclers at different annealing temperature based on the primers used. PCR products were separated on a 2% agarose gel. Different bands of DNA were visualized. Different maize accessions showed different bands which suggest that there was great variation in genetic diversity. There was variation among the accessions collected from different part of Nepal. This can be used in crop improvement programmed. Conservation, Characterization, evaluation and utilization of such valuable resources would provide a sustainable basis for Maize improvement in future with the help of molecular SSRs markers. Few Maize genotypes were contain so many bands due to reason that genotypes seem to be good in terms of yield by containing different gene which is favourable for yield. The presence of genetic diversity in crop populations was not easily detected by morphological characteristics of growing plants. Phenotypic selection of lines on the basis of few morphological characters may result in approval of cultivars with lesser variability because of the influence of environment on growth and development. The total number of alleles detected was 85 for 5 SSR markers in 23 Maize genotypes.

## **4. PLANT PROTECTION**

### **PREVALENCE OF LATE BLIGHT OF POTATO AND ITS MANAGEMENT PRACTICES ADOPTED BY FARMERS IN NORTHERN BELT OF DHADING DISTRICT**

**Binod Kumar Khatri and B.N. Mahato**

This study was conducted during 20 December 2014 to 20 July 2015. 3 VDCs viz. Phulkharka, Mulpani and Tripureshwor were selected for this study. Altogether 90 households were taken for field survey. Out of total respondents 68 percent of the respondents were literate with 24 percent and 20 percent of the respondents having primary and secondary level education, respectively. Only 16 percent of the respondents had higher secondary level education and 8 percent of the respondents had university level education. It was found that 55.6 percent of the respondents were engaged in agriculture, 16.7 percent in government job, 11.8 percent in business and remaining 16.7 percent in other services. Among 90 potato fields 6 fields were not affected with late blight, 44 fields were moderately infested with late blight, 33 fields were lower or free of late blight while 7 fields were found highly infested. During field survey only 42 farmers fields were identified with improved potato variety and other remaining potato variety couldn't identify. Among them 41 percent of field were planted with Lekali Local variety of potato, 33 percent were planted with Cardinal and 26 percent were planted with Kufri Jyoti variety of potato. These fields were affected by late blight. Out of 90 respondents, 70 respondents used chemical pesticides for disease management, remaining did not use any kind of chemical fungicides. Among 70 respondents 90 percent of respondents used mancozeb and 10 percent had used metalaxyl.

### **INCIDENCE AND SEVERITY OF CLUBROOT IN CAULIFLOWER IN NALA, KAVRE**

**Shreejana Sapkota and Madav Lamsal**

The study entitled Incidence and Severity of Club root in Cauliflower in Nala was carried out in Kavrepalanchok district during January 2015 to July 2015. The major objectives of the study were to determine the status of club root disease in cauliflower, to find out the socio-economic conditions of cole crops growers, to know the incidence and severity of the club root disease and to know the management practices followed by the farmers. Thirty respondents were purposively selected from Ugrachandi VDC, Nala. Primary data were collected using research

techniques like questionnaire survey. Survey was done by random sampling method. One hundred and eighty cauliflower plants were observed to study the incidence and severity in 30 respondent's field. Secondary data were collected from different governmental, non-governmental organizations and library visits. Mostly farmers grew cauliflower in winter season and most of them grew cauliflower in rainy season due to its high economic return during off-season. Generally Snow mystique, Silver cup, Super green, White crown, White top, and Snow dom were the varieties grown. Among the total respondents, eighty percent (%) of the farmers knew that the disease prevailing in their field was club root. While twenty percent (%) of the respondents farmers does not knew about this disease. The trend of club root disease in farmer's field was increasing. However the disease incidence and severity was mostly seen in Silver cup-60 variety. Among one hundred and eighty cauliflowers observed the disease incidence was seen in 60 plants. Of them 18 plants (thirty percent) were severely clubbed, 23(thirty percent) plants had slight clubbing and 19 (thirty two percent) plants were moderately clubbed. For management, 60% of the respondents followed crop rotation method while 40% use locally available botanicals. Growing same variety every year, continuously growing cauliflower twice a year, water lodged conditions, high moisture condition etc are the favorable conditions for disease occurrence and development. This study shows the trend of disease incidence and severity was increasing year-by-year. And it might cause a huge loss in the production of cauliflower in that area in a near future.

### **A STUDY ON OCCURRENCE OF MAJOR INSECT PESTS IN COFFEE AND THEIR MANAGEMENT PRACTICES IN LALITPUR DISTRICT**

**Sachina Sunuwar and B.N. Mahato**

A descriptive research study was conducted about "A Study on Occurrence of Major Insect Pests in Coffee and Their Management Practices in Lalitpur District" from 20<sup>th</sup> January 2015 to 19<sup>th</sup> July 2015 in Chandanpur and Thuladurlung VDCs of Lalitpur districts. A sample of 70 respondents was randomly selected from both VDCs for the study purpose. Focus group discussion (FGD) was carried out to verify the output from the study. The study revealed that White stem borer of coffee is the major cause for reduced coffee production in the study region. The white stem borer of coffee is solely responsible for affecting about 91 percent of the orchards which is followed by red stem borer (3%). Other groups of pests like grasshopper, leaf miner, scale insects, rodents, birds etc combined had minimal effect (6%) to the production as compared to borers. Among the 70 respondent's orchards, about 23 percent of the orchards have beetle infestation dating more than 5 years. About 63 percent of the orchards are recently infested with white stem borer within these 2-5 years. These were mainly the new coffee orchards farmers have replanted after removing their previous beetle infested orchard. Similarly, about 17 percent of the new orchards are also

infested with White stem borer within 2 years. In the study, (61%) majority of farmers were clearly aware of the pest biology. Many trainings and seminars were frequently conducted in those areas by different organizations, as a result of which the farmers are very skilled. Despite this, only 11 percent of the respondents have clear knowledge on integrated pest management system. Other management approaches like field sanitation, providing shade to the plants, scrubbing of stems and even spraying of botanical pesticides were reported from the study area. Even with all the trainings and skills the farmers are not at par with the management approaches especially due to lack of resources like manpower, finance, facilities and above all intervention and assurance from government bodies. The coffee farming is a lucrative business but white stem borer infestation is hindering the potentiality of this sector. If necessary measures are not taken seriously and immediately by all coffee promoting sectors, both government and non-government, then future of this sector is dark, may even cease to exist.

**AN ASSESSMENT ON MARKET OPPORTUNITIES FOR INTEGRATED PEST MANAGEMENT (IPM) GROWN PRODUCE IN RUPANDEHI AND NAWALPARASI DISTRICTS**

**Manisha Burlakoti and Binayak P. Rajbhandari**

This study entitled "An assessment of marketing opportunities of IPM grown produce in Rupandehi and Nawalparasi districts was conducted from 12<sup>th</sup> January to 20<sup>th</sup> May 2015. A total of 330 respondents were randomly selected for survey from those two districts out of which 100 consumers, 50 farmers, 10 traders, 5 Agrovets were selected from each districts. In both districts, most of the farmers were from age group of 41 to 50 years and had land holding of 3 to 6 hectares. Farmers produced different high value vegetables adopting IPM approach. Due to awareness about effect of chemical pesticides consumers were found using remedial measures like deep freezing and proper washing before consumption. Consumers of both districts preferred IPM vegetables and bought in local market haatbajar which indicate good marketing opportunities for IPM vegetables of local level. Moreover fifty-nine percent traders of both districts showed willingness to sell IPM produce to meet demand in market. But there was not enough production of IPM produce for regular supply to market. There is lack of certification procedure and quality assuring label at point of sale that did not assure consumers assured quality of product. Sixty-eight percent farmers revealed that price of IPM produce was fixed by the unilaterally traders. Forty percent Agrovets of both districts were found suggesting farmers to use biopesticides/botanicals as first priority. However some problems faced by Agrovets while recommending biopesticides/Botanicals. The study revealed that on an average B/C ratio of IPM product per hectare was 1.54. IPM product has

good marketing potential in both districts. Suggestions are made to explore the marketing opportunities for IPM grown products at local levels.

**MAJOR INSECT PEST OF TOMATO AND THEIR MANAGEMENT  
ADOPTED BY THE FARMERS OF KATHMANDU DISTRICT IN PLASTIC  
HOUSE CONDITION**

**Barsha Pantha and Yubak Dhoj G. C.**

The study entitled “Major Insect Pest of Tomato and their Management Practices Adopted by the Farmers of Kathmandu District in plastic house condition” was carried out in Tokay, Goldhunga, Manamaiju and Thankot area of Kathmandu district. Study was intended from Jan- July, 2015. Primary data was collected from 60 respondents using semi structure questionnaire and thirty respondents were chosen randomly to assess the status and occurrence of major insect pest of tomato and management practices adopted by farmers of Kathmandu district. Secondary data was collected from available literature, books, journal, research paper, HICAST library, Nepal Agriculture Research Council (NARC) etc. The surveys revealed that majority of the respondents are found in the middle age category (31 to 50). Majority of the farmers as covered in the study sites are illiterate. Regarding the insect pest incidence whitefly, leaf miner and nematodes were considered as major problem of tomato under plastic house condition which have potentiality to cause economic damage to them and other insect pest like tomato fruit fly, tomato fruit borer and aphid is very few in numbers. The pest status was found to be increasing each year due to inappropriate management practices followed by the farmers. Farmers use cultural and chemical methods as a pest management strategy. About fifty seven percent of the respondent use chemicals methods for controlling the pests in Kathmandu district. About twenty eight percent of the respondents use cultural method and about fifteen percent of respondents use both chemical and cultural method in Kathmandu district. Commonly used insecticides that are used by farmers are chloropyrifos, cypermethrin, nuvan and bavistin. The indiscriminate use of chemical pesticide has resulted pest resistance, resurgence and sometimes outbreak. Majority of farmers were unaware about methods of pest management other than chemical methods.

**STUDY ON MAJOR INSECT PEST OF CAULIFLOWER AND THEIR  
MANAGEMENT PRACTICES FOLLOWED BY THE FARMERS OF  
BHAKTAPUR DISTRICT**

**Anu Suwal and Yubak Dhoj G. C.**

The study entitled “Study on Major Insect Pest of Cauliflower and their Management Practices Followed by the Farmers of Bhaktapur District.” was carried out in Bhaktapur Municipality and Jhaukhel VDC of Bhaktapur district. Study was

intended from Jan- July, 2015. Primary data was collected from 60 respondents using semi structure questionnaire and thirty respondents were chosen randomly from Bhaktapur Municipality and remaining thirty respondents were chosen randomly from Jhaukhel VDC to assess the status and occurrence of major insect pest of cauliflower and management practices adopted by farmers of Bhaktapur district. Secondary data was collected from available literature, books, journal, research paper, HICAST library, Nepal Agriculture Research Council (NARC) etc. The survey revealed that majority of the respondents are male and mainly Newar community is residing in the study area. Regarding the insect pest incidence aphid shows higher incidence followed by DBM. Cabbage looper and cabbage butterfly have potentiality to cause economic damage to them and other insect pest like cutworm and tobacco caterpillar is very few in numbers. The pest status was found to be increasing each year due to inappropriate management practices followed by the farmers. Farmers use cultural and chemical methods as a pest management strategy. About sixty seven percent of the respondent and sixty three percent of the respondents use chemicals methods for controlling the pests in Bhaktapur municipality and Jhaukhel VDC respectively. Thirty three percent of the respondents and thirty seven percent of the respondents use cultural method in Bhaktapur Municipality and Jhaukhel VDC respectively. Commonly used insecticides that are used by farmers are chloropyrifos, dimethoate, malathion, cypermethrin, imidachloropid and dichlorovous. The indiscriminate use of chemical pesticide has resulted pest resistance, resurgence and sometimes outbreak. Majority of farmers were unaware about methods of pest management other than chemical methods.

**LIFE TABLE AND EFFICACY STUDY OF *Orgilus lepidus* (Muesebeck) IN ITS HOST *Phthorimaea operculella* (Zeller) IN KHUMALTAR, LALITPUR**

**Srishti Shah and R.P. Mainali**

An experiment was carried out in bio-control laboratory of Entomology Division, NARC, Khumaltar, Lalitpur from December 31<sup>st</sup> 2014 to April 24, 2015. The purpose of this experiment was to find out the life table and efficacy of larval parasitoid, *Orgilus lepidus* (Muesebeck) in its host Potato Tuber Moth, *Phthorimaea operculella* (Zeller). For this, mass rearing of *P. operculella* and *O. lepidus* was conducted. The life table study of *O. lepidus* was made on two nutritional condition; fed with honey water and control (without honey water). Efficacy of parasitoids was studied in laboratory over different aged host insects whereas in glass house it was studied by releasing both host and parasitoid and subsequent collection of host infested leaf followed by laboratory analysis. The life table study revealed that the egg to pupal period, pupal mortality and pupal to adult period was found to be  $18.18 \pm 3.49$  days,  $3.2 \pm 0.89$  percent,  $9.32 \pm 1.10$

days, respectively in honey water fed condition as compared to respective 14.5±1.8 days, 5.4±1.03 percent and 9.67±1.46 days in control condition. Adult longevity of male and female was found 7.73±4.06 and 7.13±3.06 days, respectively in honey water provided condition however, it was only 4.40±1.11 and 5.27±1.31 days in control condition. Fecundity in honey water provided condition (50.4±3.84 per female) was found significantly higher ( $p < 0.05$ ) than control (25.53±3.51 per female). Sex ratio was found 0.9139 and 0.658 in honey water provided condition and control, respectively. The Replacement Ratio was found 26.3 per female in honey water provided condition whereas it was only 15.4 per female in control condition. The efficacy study of parasitoid on different aged *P. operculella* larva in laboratory condition revealed that the maximum rate of parasitization was found on 3 to 6 days old host larva. The efficacy study of parasitoid on glass house condition showed that the both population of host and parasitoid was build where population of host was found 81.13 percent and parasitoid was found 18.87 percent indicating establishment of parasitoid was somewhat successful in glass house condition. Hence, this study illustrated that the larval parasitoid, *O. lepidus* is potential to parasitize the moth population and for healthy production of potato, their mass production and utilization is imperative.

### **STATUS OF MUSHROOM CULTIVATION AT BALAMBU VDC KATHMANDU**

**Vawana Acharya and Gopal Prasad Parajuli**

The status of mushroom cultivation, problems faced by the farmers, marketing system, and cost/benefit ratio at Balambu VDC was studied from January 2015 to July 2015 using a set of pre-tested questionnaire. Agriculture was the main occupation of majority respondents of the study area where literacy rate was higher than expected (88%). Majority of the mushroom farmers were medium to large scale land holders, and they were mostly inspired by their past experiences and leader mushroom growers. Oyster mushroom was the dominant species. The sciarids, phorids and Green mould infestation were found high. Though the mushroom was widely grown in the VDC and dominates over the crops in production still technical man power expertise in mushroom farming was inadequate as per the required for mushroom farming. Government was lacking behind to provide proper training to the concerned growers and to reward large scale commercial growers as well. There was a serious problems regarding mushroom cultivation such as straw insufficiency (99%), training (76%), and marketing (44%) etc. throughout the VDC. Mushroom was found as an important commodity and has a great market potential. Majority (40%) of the farmer's were selling mushroom through brokers due to which they were not getting expected return from their produce. They were largely ignorant

about the market price and the pricing policy. The cost of production of oyster and button mushroom were NRs 68.15/kg and NRs 230.33/kg respectively. The benefit cost ratio of oyster and button mushroom were 1.73 and 1.64 respectively. The study showed that farmers were financially in viable condition.

### **ALLELOPATHIC EFFECT OF FABA BEAN, CARAWAY, WINTER TURNIP RAPE AND WHITE LUPIN ON ARABIDOPSIS GERMINATION**

**Aashika Nepal and Binayak P. Rajbhandari**

The study was done in the University of Helsinki, Finland from March to August, 2015. The study was based on allelochemicals in laboratory scale studying the plant to plant interference at germination stage. The goal of the study was to understand the allelopathic effect of Faba bean, caraway, winter turnip rape and white lupin on Arabidopsis germination. An experimental study was conducted in order to do the analysis and the observation was done at regular interval of time. Two methods were applied using different medium. Water was used in the first method while agar was used on other. Germination extract was mixed with both the medium; and analysis was done on the basis of individual experiment. In both the study, germination extract was taken from the 72 hours of sowing and was mixed with medium. Then Arabidopsis (a weed plant) was sown and the result was recorded. In first trial, germination of White lupin was found to be inhibited. This may be due to the presence of isothiocyanates which is present in the White lupin extract. In second trial, there was no inhibition of germination but the length of Faba bean root was stunted and twisted. There were also hairy root in case of Faba bean. This may be due to the presence of mucilage exudation. Thus the behavior of the inhibition of germination in case of White lupin and the stunted root in case of Faba bean showed the presence of toxicity in the medium. Thus the allelopathic effect of Faba bean, caraway, winter turnip rape and white lupin was observed during the research. Allelochemicals are released by different parts of the plants at different stages but only the germination stage was considered in this research. Hence, further study should be carried out considering all the allelochemicals. This research was carried out in a limited short timeframe. Besides allelochemicals, timeframe should also be taken into account while carrying out further analysis regarding allelopathic effect.

### **SCREENING OF WHEAT VARIETIES AGAINST YELLOW/STRIPE RUST DISEASE**

**Pratikshya Karki and B.N. Mahato**

The study entitled “Screening of wheat varieties against yellow/stripe rust disease” was carried out in a research field of Plant Pathology Division (PPD), Nepal

Agricultural Research Council (NARC), Khumaltar- Lalitpur district. The study was conducted from 25<sup>th</sup> November 2014 to 28<sup>th</sup> July 2015 at NARC, Khumaltar. Three different types of nurseries were evaluated to know disease prevalence and severity of yellow rust disease. Disease scoring was done according to Modified Cobbs Scale. 491 wheat varieties/genotypes received from Wheat Disease Screening Nursery (WDSN), 110 genotypes from International Disease Trap Nursery (IDTN) and 104 advance lines of wheat genotypes received from International Maize and Wheat Improvement center (CIMMYT) were evaluated for multiple diseases at Khumaltar, Lalitpur during 2014-15. In WDSN, out of 491 wheat genotypes, eighty one (16.49%) of wheat genotypes in 1<sup>st</sup> score and twenty five (5.09%) wheat genotypes in 2<sup>nd</sup> score had shown high severity of yellow rust infection (LR-52, NL30, RR21). The disease score was highest with 80S-90S in genotypes HD 1982, Gautam, Kalayansona. Wheat Genotypes NL1208, WK2286 were observed resistance to yellow rust. Wheat Varieties WK2218, Bhrikuti, Dhaulagiri, Gaura were found with Adult Plant Resistance (APR). Out of 110 entries from IDTN, Twenty (18.18%) wheat genotypes were found with high severity of yellow rust infection (Thatcher, Kanchan). The disease score was highest in Genotypes ALTAR 84(Durum), GAZA (W277) Durum with 80S. Some of genotypes Punjab85, Bhrikuti, HD2204 were found resistance. Wheat varieties PasangLamu, Annarpurna-1, Kukuna, Amadina were free from yellow rust infection and was recorded resistance. Out of 104 wheat genotypes of advance line (CIMMYT), 14(13.46%) entries were recorded with medium severity. Wheat varieties Cianot 70, Tacupeto were observed resistance. Wheat genotypes Bhrikuti, Dhaulagiri, Gaura were Adult Plant Resistance to yellow rust disease at Khumaltar condition in mid hills.

## **5. SUSTAINABLE AGRICULTURE**

### **ASSESSMENT OF INTEGRATED PEST MANAGEMENT PRACTICES AND INCIDENCE OF PEST OCCURRENCE/DAMAGE IN DANG DISTRICT**

**Binod Joshi and Binayak P. Rajbhandari**

The study entitled “Assessment of Integrated Pest Management Practices and Incidence of Pest Occurrence/Damage in Dang District” was carried out to document and analyze the various pest management practices adopted by local growers in study sites. This study was conducted in three eco-villages viz. Hekuli, Srigaun, and Paddha of Dang district during January 10 to May 10, 2015. A total of 100 households were selected from three eco-villages of Dang with stratified random sampling method. These eco-villages were selected purposively because of the engagement of their inhabitants in IPM approach. It was found that 87 percent of the respondents were engaged in agriculture. Rests of the respondents were in wages, foreign employment and other services. Majority of the farmers were found having limited awareness about safe pesticide management and its negative impact on their health and environment. Application of various highly toxic exotic chemical pesticides to suppress insect pest population in their field without proper knowledge of appropriate dose of pesticides and without identification of the pests in their fields was found a common practice. It was also found that majority of the farmers (65%) were unknown about the alternative sustainable integrated pest management strategies such as application of botanical pesticides and bio-pesticides. Although they were practicing some agro-ecological practices of sustainable integrated pest management (SIPM) e.g. crop rotation, mixed cropping and scouting, they were not doing these in a coordinated manner. Based on the results of the study some suggestions are made for the promotion of SIPM practices in the eco-villages.

### **ASSESSMENT OF INTEGRATED PLANT NUTRIENT MANAGEMENT PRACTICES AND SOIL FERTILITY STATUS IN DANG DISTRICT**

**Khem Raj Khatri and Binayak P. Rajbhandari**

This study entitled Assessment of Integrated Plant Nutrient Management Practices and Soil Fertility Status in Dang District was conducted during 15 January 2015 to 12 June 2015. A total of 100 households were selected for the study employing random sampling method. Altogether 25 soil samples were collected from 3 different

nutrient management practices (T<sub>1</sub>- with chemical fertilizers only; T<sub>2</sub>- with IPNM; and T<sub>3</sub>- with organic manure only) for soil analysis. The comparative study of soil physical parameters i.e. soil texture, soil chemical parameters i.e. pH, OM, N, P and K content of all soil samples was done. The mean soil texture of all soil samples was found to be sandy loam. The value of N, P, K and OM was found higher in T<sub>3</sub> than T<sub>1</sub>. The mean pH value of T<sub>1</sub> was 6.3, T<sub>2</sub> was 6.65 and T<sub>3</sub> was 6.7 where, differences in pH value between T<sub>1</sub> & T<sub>2</sub> as well as T<sub>1</sub> & T<sub>3</sub> were statistically significant at  $p \leq 0.05$ . Similarly, the mean value of OM was found to be 4.66% in T<sub>1</sub>, 4.25% in T<sub>2</sub> and 6.62% in T<sub>3</sub>. Difference in OM content between T<sub>1</sub> & T<sub>3</sub> as well as between T<sub>2</sub> & T<sub>3</sub> was significant at  $p \leq 0.05$ . The mean value of total N was found to be 0.052% in T<sub>1</sub>, 0.071% in T<sub>2</sub> and 0.092% in T<sub>3</sub>. Difference in N content between T<sub>1</sub> & T<sub>3</sub> was statistically significant at  $p \leq 0.05$ . Similarly, the mean value of available P was found to be 22.48 kg ha<sup>-1</sup> P<sub>2</sub>O<sub>5</sub> in T<sub>1</sub>, 38.42 kg ha<sup>-1</sup> P<sub>2</sub>O<sub>5</sub> in T<sub>2</sub> and 37.446 kg ha<sup>-1</sup> P<sub>2</sub>O<sub>5</sub> in T<sub>3</sub>. Differences in P content between treatments were not significant statistically. Mean value of K was found to be 286.83 kg ha<sup>-1</sup> K<sub>2</sub>O in T<sub>1</sub>, 286.83 kg ha<sup>-1</sup> K<sub>2</sub>O in T<sub>2</sub> and 554.74 kg ha<sup>-1</sup> K<sub>2</sub>O in T<sub>3</sub>. Difference in K<sub>2</sub>O content between T<sub>1</sub> & T<sub>2</sub> as well as between T<sub>1</sub> & T<sub>3</sub> was significant at  $p \leq 0.05$ . The study confirmed that the fertility status of the study area was declining due to the imbalanced use of chemical fertilizers, mono- cropping, and use of lower amount of organic fertilizers. Lack of leguminous crop in intercrop and same type of cropping patterns for a long period may be other factors of poor soil fertility. It was found that fertility status of organic field was found to be better in term of fertility and OM content than inorganic fields.

### **ASSESSMENT OF INTEGRATED PLANT NUTRIENT MANAGEMENT PRACTICES AND SOIL FERTILITY STATUS IN UDAYAPUR DISTRICT**

**Roshana Karki and Binayak P. Rajbhandari**

The study on “Assessment on integrated plant nutrient management and soil fertility status in Udayapur district.” was conducted to find out the plant nutrient management practices adopted by the respondents of Udayapur district and to reveal the soil fertility status of study sites. A study was conducted from January 10 to July 10, 2015. The study was conducted in 2 VDCs namely Bhalayedada, Jalpa and 2 location from municipality namely Chaukibari, Behedwa of Udayapur district for the study. Twenty Five respondents were selected from each site by using a Stratified random sampling technique. The total sample size was 100 households. Soil samples were taken from 40 farmers to know the level of nutrients in the soil. There was a positive and significance ( $p < 0.01$ ) correlation coefficient between dose of organic manure and yield of different crops. Positive correlation had been noted, with the crops like chayote ( $r=0.42$ ,  $p < .001$ ), rice ( $r=0.95$ ,  $p < .001$ ), mustard ( $r=0.96$ ,  $p < .001$ ), wheat ( $r=0.36$ ,  $p < .001$ ) at Jalpa, Chaukibari, Bhalayedada and Behedwa

respectively. The level of nitrogen, phosphorus and potassium of study sites were very low due to the unbalanced use of fertilizers and nutrient mining in soil. Overall finding of the study showed that although there were many sources of plant nutrient management practices, organic fertilizers was the best source that improve soil fertility, status, created a better soil environment, reduced environmental hazards and improved crop productivity served as a sustainable source. The farmers perceived that the application of FYM and compost resulted higher grain yield than that of chemical fertilizers. Unbalanced fertilizers use, lack of FYM management, unawareness about green manures and bio fertilizers were main causes of constraints related to soil fertility.

### **ASSESSMENT OF INTEGRATED PEST MANAGEMENT PRACTICES AND INCIDENCE OF INSECT PESTS OCCURRENCE/DAMAGE IN UDAYAPUR DISTRICT**

**Manoj Pant and Baburam Gautam**

The study entitled “Assessment of Integrated Pest Management Practices and Incidence of Insect Pests Occurrence/Damage in Udayapur District” was carried out to document and analyze various pest management practices adopted by IPM FFS participated and non-participated farmers in study sites. The study was conducted in Uttaraitole eco-village of Triyuga municipality and 4 VDCs i.e. Saune, Khanbu, Bhalayadanda and Panchawati of Udayapur district from 10<sup>th</sup> January to 10<sup>th</sup> of July 2015. The survey research was conducted with a semi-structured questionnaire interview with total 100 samples population selected by stratified random sampling method in which 50 IPM FFS participated farmers and 50 IPM FFS non-participated farmers were included. The study revealed aphids and cutworms as the major pests in vegetable crops while stem borers and rice bugs as major pests in cereal crops. The damage in vegetable crops and cereal crops due to pests was found comparatively much higher among IPM FFS non-participants than those of participants. Most of the IPM FFS participated farmers (54%) were found using various pest management techniques such as geeti mal (made by using local botanicals and cattle urine), handpicking, chemicals etc in an integrated manner while majority (90%) of the IPM FFS non-participated farmers had relied on single method either handpicking or chemicals for pest management. Moreover, there was lack of proper knowledge on handling, dose and right time of pesticide application among IPM FFS non-participated respondents. The use of eco-friendly tools of pest management such as microbial based bio-pesticides, light traps, pheromone traps and natural enemies is still rudimentary among both types of respondents because of lack of knowledge and poor accessibility. Most of the farmers in the study sites had positive attitude toward IPM program and were found interested in adopting IPM practices but lack of

necessary knowledge has become an obstacle. The study depicted the urgent need to communicate the farmers about the safe production with maximum utilization of IPM tools as it seemed to have positive impact on yield.

Keywords: IPM, FFS, Pest

**INTER-RELATIONSHIP BETWEEN WOMEN'S EMPOWERMENT,  
FOOD/NUTRITIONAL SECURITY AND ENGAGEMENT IN BIO-  
INTENSIVE FARMING SYSTEM IN UDAYAPUR DISTRICT**

**Tejaswee Shiwakoti and Binayak P. Rajbhandari**

The study on “Inter-relationship between women’s empowerment, food/nutritional security and engagement in bio-intensive farming system in Udayapur District” was conducted to analyze the women participation in Bio-intensive farming system, its impact on their income generation as well as to assist the nutritional security at the research site. The study was conducted in two VDC’s, namely Hadiya and Jogidaha of Udayapur district. The stratified random sampling method was used for selection of the respondents and the sample size was 80 households, 40 from each VDC’s. The study was conducted from 10 January to 10 May 2015. The study showed that the maximum (16.25%) farmers who implemented BIFS were since past three years. The VDC’s where WOREC has been working were found to know about BIFS and also following in their field whereas at other places farmers were unaware about it and following the conventional farming system. The study also revealed positive impact of BIFS on household income and empowered women of the study sites. There were major social changes in which women involved in groups and meetings, they have increased their decision power as well as have control over their resources. The nutritional condition, health and hygiene of the family had been improved after adopting BIFS. The children both male and female have access to school and the nutritional status was not compromised for the children. In the study area, before farmers used to adopt rice based cropping system whereas now the trend of vegetable cultivation is also a major technological change. Farmers do apply chemical fertilizers more than before but now farmers are also engaged in FYM making, compost and botanical pesticides. The study showed that most farmers from Hadiya were adopting BIFS than Jogidaha. The women were more active which made them to participate in the groups and helped them to be empowered. The implication of BIFS were positive for the women of the study sites which has encouraged them to actively participate, make decision and uplift the nutritional status for them and their family.

**INTER-RELATIONSHIP BETWEEN WOMEN'S EMPOWERMENT,  
FOOD/NUTRITIONAL SECURITY AND ENGAGEMENT IN BIO-  
INTENSIVE FARMING SYSTEM IN SIRAHA DISTRICT**

**Saiyad Hussian and Binayak P. Rajbhandari**

The thesis entitled “Interrelationship between Women empowerment, Food/nutritional security and Engagement in Bio-intensive Farming system was carried out in Siraha. Field survey was carried out from January 10 to April 10, 2015 AD. 80 farmers, randomly but purposely were selected from in four wards of Bastipur (4,5,8,9), one ward Dhangadi (1), one ward of Govindpur (5), and one ward of Padariya (8). Socio-demographic study revealed that 95% of female farmer were involved in BIFS in this area. Average family size was found to be 6.92 ( $\approx 7$ ). Agriculture was found to be major occupation of the respondents. The average land holding was only 19.5 kattha (0.65 ha) in the site. Rice and wheat as major cereal crop, potato, cauliflower, tomato, brinjal as major vegetable and lentil, rajaras as major grain legume was grown in this area. The majority of farmers used motor as major irrigation source. Drought and lack of irrigation facilities were the main reasons for low agriculture production. Though agriculture was major occupation there about 72.5% of respondents didn't have enough food from their production and face the problem of food shortage every year. Only 8.8% of respondents were found not facing the problem of food shortage. To meet their daily food requirement, they purchase from the market and work as a labor in the period of food shortage. After adopting BIFS, the percentage of women having improved nutrition is 90% and those not having are only 1.25%. The percentage of respondents having own toilet was found to be 82.5% and those not having their own toilet was 17.5%. Only 17.5% of total interviewed respondents had improved cooking stove while 82.5% of respondents didn't have improved cooking stove in the study area. The average annual expenditure on food in the study area was found to be Rs. 115812.5. The average annual expenditure on education in the study site is calculated as Rs.46581.5. Similarly, average annual expenditure on health was calculated as Rs. 17,100. The Pearson correlation coefficient ( $r$ ) for household income and expenses on food, education, and health services was found to be -0.018, 0.33, and 0.06. Similarly the variables like dose of chemical fertilizers and compost had moderate relationship with production trend of lowland crops with the Pearson correlation coefficient 0.09 and 0.29 respectively. The major problem faced by women in the study site was lack of access to education, health facilities, lack of employment, and heavy loads of work, violence and early marriage.

## **6. VETERINARY SCIENCE**

### **SCREENING OF FECAL SAMPLES FOR CRYPTOSPORIDIUM OOCYSTS IN CATTLE AND BUFFALO OF BHOTEWODAR, LAMJUNG**

**Anup Adhikari and Doj Raj Khanal**

Cryptosporidium is an important zoonotic pathogen transmitted primarily through water. This study was conducted to determine the occurrence of Cryptosporidium in buffaloes and cattle in relation to the river water in the river basins of Marsyangadi. This cross sectional study was conducted during October 2015 to January 2016. A total of 100 dung samples (50 buffalo and 50 cattle living near the river basins of Marsyangadi) were examined for the presence of Cryptosporidium oocysts by Ziehl-Neelsen Staining technique after Modified Sheather concentration method with centrifugation. A comparative study was of 100 samples tested. The overall prevalence of cryptosporidium oocysts was 4% in fecal samples of cattle and buffaloes of Bhotewodar, Lamjung. Species wise, prevalence of oocysts in buffalo and cattle was 5% and 2%, respectively. The higher prevalence could be due to wallowing habit of buffaloes.

### **DETECTION OF ANTIBODIES AGAINST BLUETONGUE VIRUS IN MILK SAMPLES OF LARGE RUMINANTS IN KATHMANDU VALLEY**

**Barjesh Yadav and Doj Raj Khanal**

Bluetongue is an infectious, non-contagious, arthropod (Culicoides species) transmitted disease of sheep with possible occurrence in other domestic and wild ruminants. A study on prevalence of bluetongue in cattle and buffalo was conducted during September 2015 to January 2016. A total of 92 milk samples were collected from, farms of Kathmandu, Lalitpur and Bhaktapur districts. The milk samples were tested for BTV antibody in cattle and buffalo using indirect ELISA at the laboratory of Animal Health and Research Division, Khumaltar, Lalitpur. Out of total 92 samples, 75 (81.52%) milk samples were found positive, 2 (2.17%) samples were negative and 15 (16.30%) were doubtful for BTV antibody. The antibody for BTV in cattle and buffalo samples was found to be 100% and 66.66% respectively. Among three districts, the prevalence of BTV was higher in Kathmandu (100%) and Lalitpur (100%) than Bhaktapur (58.53%), this may be due to variation in sample size, along with variation in geographical location and presence of vector in pastureland and farms. As bluetongue is considered to be a major TAD (Transboundary Animal

Diseases), there is a need to carry out clinical surveillance of bluetongue in cattle and buffalo using milk/serum sample in other susceptible ruminants and also subsequently developing the control strategy of bluetongue disease in the country.

### **TRENDS OF ANTIMICROBIAL USE IN POULTRY OF KATHMANDU VALLEY**

**Bilochan Bhandari and Bishwas Sharma**

The study on trend of antimicrobial used for poultry at Kathmandu valley was conducted during October, 2015 to March, 2016. The study sites were Kathmandu, Bhaktapur and Lalitpur districts of Kathmandu valley. A structural questionnaire was used to collect the information from Veterinary drug importers, Veterinary pharmaceuticals, wholesalers and retailers. The information collected were product names and quantity of those products imported, manufactured and/or sold during 2008 to 2014 AD. Antimicrobials were classified using Clinical and Laboratory Standards Institute classification and trend of antimicrobials imported/manufactured per year was evaluated. During 2014, 32.6 tonnes of antibiotics were used for poultry. Between 2008 and 2014, there has been an increase of 78.9% in the total consumption of antimicrobial drugs for poultry. Between 2008 and 2014, there have been a total growth of 70.1% in the total quantity of import of antimicrobial drugs and a total growth of 106.2% in the total quantity of domestic production. Antimicrobials class critically important to humans among those used in food animals of Nepal were found to be increasing from 17.5% in 2008 to 20.2% in 2014. This finding shows that there is an increasing trend in use of antimicrobials in poultry of Kathmandu valley. Strict regulatory control and proper record keeping should be practiced for effective monitoring of antimicrobial use in poultry and other food animals. This finding shall form the baseline data for future studies, thereby allowing the determination of trends over time.

### **SERO-PREVALENCE OF PORCINE TAENIASIS IN SWINE OF KATHMANDU DISTRICT, NEPAL**

**Bikash Shrestha and Rupendra Chalagain**

The study on sero-prevalence of Taeniasis in swine population was conducted from July, 2015 to December, 2015 in Kathmandu district, Nepal. The study sites were six wards namely Baluwakhani-13, Bhangal-14, Manohara-35, Jarangu-4, Chuchepaati-7, and Teku-7. A structural questionnaire was used to collect the primary information from the farm, and the information regarding farm characterization, livestock

production system, feed resources, feeding and management and health status. Laboratory work was performed to determine the sero-prevalence of Taeniasis at the Parasitology Laboratory of Animal Health Research Division of NARC. A total of 94 blood samples were tested for the presence of Taeniasis by ELISA test. Overall 8.51 % of the samples were positive for Taeniasis. Sow had higher (11.47%) prevalence rate than boar (3.03%). Similarly, the prevalence was higher (10%) in improved breed of swine followed by local breed having lowest (4.17%) prevalence rate. The relationship between the prevalence of Taenia infestation and the type of housing system revealed that prevalence was high (13.33%) in modern housing system followed by free range housing system (5.26%) and least (3.33%) infestation in semi conservative type of housing system; whereas the prevalence according to the production system in continuous type was higher (13.21%) followed by household type of production (3.12%). Five samples (7.94%) were found to be positive among the good growth performance followed by poor growth (10%) performance of swine population. This study indicated that there is prevalence of Taeniasis in pig population of Kathmandu district which might be the risk factor for public health concern.

#### **PREVALENCE OF (*Fasciola species*) IN CATTLE OF TANAHUN DISTRICT**

**Binaya Saha and Swoyam Prakash Shrestha**

A study on prevalence of Fasciola in cattle of Tanahun district was conducted from September-December 2015. A total number of 155 faecal samples were collected and examined. The faecal samples were examined for the presence of Fasciola by sedimentation method. Among them 43.22% were found to be positive. 62.85% (22/35) of the samples of Dumsi was found positive while it was 45.71% (16/35) in Farakchaur likewise 40% (18/45) in Jamune and 27.5% (11/40) of the samples of Yampa was found positive. The prevalence of Fasciola was found to be 58.46% (38/65) in Holestain Fresion cross where it was 35.71% (25/70) in Jersey cross likewise, 20% (4/20) in local cattle. The prevalence of Fasciola was found 45.98% (63/137) in female where as 22.22% (4/18) in male cattle. The prevalence of Fasciola was found to be 45% (9/20) on semi stall/semi grazing feeding system where as 42.96% (58/135) on stall feeding system. The prevalence of Fasciola was found to be 54% (54/100) on irregular deworming cattle where as 23.63% (13/55) on regular deworming cattle. The prevalence of Fasciola was found to be 46.87% (15/32) on pregnant cattle where as 42.27% (52/123) on non pregnant.

**SERO-PREVALENCE OF INFLUENZA 'A' AMONG THE SWINE OF EASTERN, CENTRAL AND WESTERN REGION OF NEPAL**

**Bishal Pokhrel and Meera Prajapati**

A study was conducted on the prevalence of swine influenza in pigs of Jhapa, Sunsari, Kathmandu, Chitwan and Pokhara districts from September to December, 2015. A total of 92 serum samples were collected from pigs by systematic simple random sampling technique. Enzyme linked immunosorbant assay [ELISA] of ID VET company France was used to determine the seroprevalence of swine influenza A. Overall prevalence of swine influenza was 21.73%. Out of total 92 samples 20 samples (21.73%) were found to be positive for influenza A. This study has shown the presence of influenza A virus in pig population in Nepal. Further study for identification of serotypes is recommended.

**PREVALENCE OF DEMODEX IN CANINE OF KATHMANDU VALLEY**

**Nitesh Karki and Bala Ram Thapa**

The study was carried out to find prevalence of Demodex in pet dogs of Kathmandu valley from September 2015 to January 2016. A total of 100 samples of dermatological cases were taken from pet dogs that were brought at Mobile Veterinary Consultancy Service (MVCS), Jawalakhel, Lalitpur. Results showed that out of 100 samples, 46(46%) samples were positive and 54 (54%) samples were negative for Demodex cases. While comparing sex wise prevalence the result showed that out of 55 samples of male, 28 (50.90%) were found positive and out of 45 female sample, 18 (40%) were found positive. While comparing breed wise prevalence the result showed that out of 60 pure breed sample, 30 (50%) were found positive and out of 40 cross breed samples 16 (40%) samples were found positive. In age wise prevalence the age group between 0-4 years of age, out of 58 samples, 30 (51.72%) were found positive and between 4-8 years of age, out of 42 samples, 16 (38.09%) were found positive. In sex wise, age wise and breed wise comparison of Demodex was found statistically not significant at  $P < 0.05$ .

**STUDY OF SERO-PREVALENCE OF BOVINE BRUCELLOSIS IN DAIRY CATTLE OF KATHMANDU VALLEY**

**Praveen Singh Lama and Mukti N. Shrestha**

A study was conducted from September to November 2015 to find the prevalence of Brucellosis of cattle of Kathmandu valley. Out of a total 100 serum samples randomly from indigenous cattle and exotic cattle of Kathmandu valley including the

history of abortion, still birth and other symptoms related to Brucella ,20(20%) were to be positive reactor for antibodies against Brucella with Rose Bengal Plate Test. All the respondents in the study adopt artificial insemination technique. Considering the high prevalence of the disease in the population studied suitable preventive and control measures including the adoption of test and slaughter of seropositive animals, effective quarantine, legislative measures and awareness program for farmers, meat sellers and other concerned bodies was highly recommended.

### **ANTIBODIES DETECTION OF HEMORICKETTSIA (ANAPLASMA) IN CATTLE OF THREE ECOLOGICAL BELT OF NEPAL**

**Season Sainju and Swyam Prakash Shrestha**

Bovine Anaplasmosis, caused by *Anaplasma marginale*, is an infectious but non-contagious disease. It is spread through tick bites or by the mechanical transfer of fresh blood from infected to susceptible cattle from biting flies or by blood-contaminated fomites including needles, ear tagging, de-horning and castration equipment. This study was done to compare the antibodies to *Anaplasma* in the serum samples of cattle from different ecological belt of Nepal. Out of 60 serum samples, 20 from each ecological zone (Jumla, Kavre and Banke), tested for antibodies to *Anaplasma* using Ubioquick VET Bovine Anaplasma Antibody Rapid Test kit, 55% samples from Jumla were found to be sero-positive along with kavre75% and Banke 90% respectively. The overall prevalence was found to be 73.33%. The higher percentage of sero-positivity is due to the absence of control strategy against the vectors and hardy nature of cattle that make the disease in subclinical form. There is gradual decrease in the tick infestation with increase in altitude and decrease in temperature. Control measures could be the maintenance of *Anaplasma*-free herds, vector control, administration of antibiotics and vaccination.

### **STUDY ON HEMATOLOGICAL CHANGES IN (*Ehrlichia canis*) POSITIVE DOGS OF KATHMANDU VALLEY**

**Surya Chandra Thoker and Bala Ram Thapa**

Canine Ehrlichiosis is an important immunosuppressive tick born disease in dog. The main causative agent of this disease is *Ehrlichia canis*. Improved breeds of dogs are being popular among inhabitants of Kathmandu valley. Improved breeds of dogs are more vulnerable to various diseases than the native breeds. Among them endoparasitic infestation is one of the most common diseases in the improved and local breeds of dogs resulting to anemia. It was suspected that canine Ehrlichiosis is the primary cause of anaemic diseases. This study was carried out from August 2015 to December 2015 at Mobile Veterinary Consultancy Services, Jawalakhel, Lalitpur

to determine the haematological changes on Ehrlichia canis infected dogs of Kathmandu valley. The haematological study revealed significant decrease in the value of PCV, RBC, and Hb level. Lhasa apso was found to be severely affected followed by Japanese Spitz. Similarly significant increase in neutrophil count was observed, whereas the lymphocyte count was found to be within the normal range. Local breeds of dogs were found to be less critical than the exotic breeds of dogs. Thus early monitoring of haematological changes in the dogs will help in early diagnosis and prompt treatment of infected dogs.

**PREVALENCE OF FASCIOLOSIS IN GOATS OF KUNATHARI VILLAGE DEVELOPMENT COMMITTEE OF SURKHET DISTRICT**

**Umesh Giri and Krishna B. Shrestha**

A study was conducted from September to December, 2015 to determine the prevalence of Fasciolosis in goat of Kunathari Village Development Committee of Surkhet district. A total of 230 goats were selected and sampled by using systematic simple random sampling. Sedimentation technique and centrifugation were employed during the study period. Overall prevalence of goat Fasciolosis were found to be 54 (23.47%). Out of total 230 samples, 54 (23.47%) samples were found to be positive for Fasciolosis and 176 (76.53%) samples were negative. A total of 132 faecal sample of male goats were examined in the laboratory which showed that 30 (22.73%) were positive. Similarly, out of 98 faecal samples of female goats, 24 (24.49%) were positive. The breed-wise prevalence on Fasciolosis in goat showed that 21 (15.56%) out of 135 were positive in Khari breed and 33 (34.74%) out of 95 were positive for exotic cross. A total of 40 faecal samples of 4-12 months aged goats were examined in laboratory in which 7 (17.5%) were positive. Similarly, 32 (26.02%) out of 123 and 15 (22.39%) out of 67 samples were positive for 12-24 and 24- above months age goats respectively. Out of 28 faecal samples taken from stall fed goats, 5 (17.86%) were positive and 49 (24.26%) out of 202 were positive for grazed goats. 34 faecal samples of pregnant goats were examined in the laboratory which showed that 5 (14.71%) were positive. Similarly, out of 64 faecal samples of non pregnant goats, 19 (29.69%) were positive. Out of the 154 samples taken from hillside area goats, 28 (18.18%) were found to be positive and 26 (34.21%) out of 76 were found to be positive for riverside area goats.

**SCREENING OF BOVINE VIRAL DIARRHOEA VIRUS (BVDV)  
INFECTION IN DAIRY HERDS OF KAVREPALANCHOWK DISTRICT  
OF NEPAL**

**Kshitiz Paudel and Tara Nath Gaire**

Bovine Viral Diarrhoea (BVDV) causes respiratory and reproductive disease in animals and is reported in many parts of world. In Nepal, livestock is an important source of income and majority of reproductive problems among dairy herds in Nepal are due to infections and poor nutrition and large proportion of these reproductive problem remains undiagnosed. The status of BVDV in Nepal is unknown. The aim of this study was to determine the prevalence of persistent BVDV infection in dairy herds of Kavrepalanchowk district of Nepal. Total, 87 ear notch samples from 30 dairy herds were collected from cattle and buffalo from September 2015- November 2015 and tested using IDEXX BVDV Ag Test Kit. Questionnaire survey was conducted to collect the information on individual and farm characteristics. The farm wise prevalence was 10% whereas individual prevalence was 3.4%.The highest prevalence of BVDV varies in different location with highest in Chalal Ganesthan VDC (14.28%) followed by Kharelthok VDC (10%) and lowest in Panauti municipality (3.13%). The prevalence of BVDV was higher in age group 6- 2 years (20%) and lowest (4%) in age group below 6 months. (5.35%) Cattle owned species wise prevalence while none of the buffalo were positive. Regarding various breed, the prevalence of BVDV in cross breed was (3.77%) followed by exotic (2.94%). This study showed the circulation of BVDV in dairy herds of study area. Questionnaire survey indicates overall poor biosecurity in dairy farm, use of natural insemination for breeding with bulls of unknown origin which may contribute to the spread of BVDV infection. Based on this study we suggest regular surveillance and diagnostic activities need to be carried out in commercial dairy farm.

## 7. MEAT AND DAIRY TECHNOLOGY

### QUALITY ASSESSMENT OF RAW EMULSION SAUSAGES AVAILABLE IN KATHMANDU VALLEY

**Modnath Gautam and Achyut Mishra**

This study was conducted in September, 2015 to evaluate the quality of sausage marketed in Kathmandu valley. The quality of meat, fat and quantity of meat and other non meat ingredients are the vital in the overall quality of sausage. Considering the same hypothesis to check the quality status of emulsion chicken sausages sold in Kathmandu valley was undertaken. A total of 52 Sausage samples of different brands and the control samples prepared in laboratory were analyzed. To assess the quality: moisture, protein, fat, carbohydrate, collagen and peroxide values were analysed. The moisture content of the sausage samples were in the normal range below 65% in the marketed samples however the moisture content in most of the samples were significantly different ( $p < 0.05$ ). Similarly, the range of the fat content in sausage samples has been found from 30.04 to 55.27% on dry basis. Fat contents were highly significant different ( $p < 0.001$ ). The peroxide value (PV) in all samples tended to increase significantly by the progress of the storage period up to 30 days except the chicken sausage of two samples code 2 and 3. At the first day of collection the PV was in the range of 0.43 to 4.25 (meq/kg fat) and at 30 days, it reached to 2.71-8.52 (meq/kg fat). The market samples contained low peroxide values compare to Nepal Standard (NS) i.e. 10 meq/kg fat. However, the low peroxide value may be due to the addition of antioxidant and vacuum chopping during the manufacturing of sausage. Protein contents in sausage samples were statistically different ( $p < 0.05$ ) ranging from 38.77% of sample code 3 to 64.21% of control sample. The highest protein was found in the control sample. The quality of meat protein was observed in terms of collagen. The highest collagen content in the sausage samples in this study was found in sample code 2 (3.50% of sausage on dry weight basis) and the similar concentration was found in control sample (3.24%) which might be due to higher protein content. The collagen based on total protein was found significant different ( $p < 0.05$ ) (ranging from 12.50 to 20.68) except 2 samples code 3 and 4. The highest collagen was found in the sample 2 (20.68%), lowest collagen content was found in sample 1 (12.50%) and in the control sample (14.42%). The calculated value of collagen in terms of total protein was fall in the range. Carbohydrates were found excess ( $>5\%$  in) in 2 samples sample code 2 and 4 of the marketed samples so can be said adulterated with starchy flour. In overall, the sample 2 was found highly

adulterated in terms of collagen, carbohydrate and protein content. It also indicated adulteration with higher water and poor quality fat.

### **PROCESS OPTIMIZATION OF FLAVOR YOGURT PREPARED FROM STANDARD MILK AND SOYMILK BLEND**

**Niranjan Timilsina and Krishna Gopal Shrestha**

A research was carried out to replace the levels of standardized market milk with soymilk in yogurt manufacturing and also to study the effect of different proportion of market milk with soymilk in physiochemical, sensorial quality, shelf life and change in cost of yogurt. The experiment was conducted in completely randomized design (CRD) with four treatments of 0, 25, 50 and 75 percent inclusion of soymilk at HICAST, Kathmandu, Nepal & each treatment were replicated for four times. The physiochemical properties such as Fat, Acidity, P<sup>H</sup>, Total solid & Protein content were determined. Along with these, microbiological test such as Coliform and Yeast & Mold count were done by using standard methods to determine its quality parameters. Statistical analysis of score obtained from the physiochemical analysis showed that there was a significant variation in P<sup>H</sup>, acidity, fat, protein and total solid content among the treatment at p>0.05 was due to the difference in chemical compositions of types of milk, which could be the most dominating reasons for increase and decrease in different physiochemical parameter of the soy blended flavor yogurt. From analysis, it was found that acidity; fat content & total solid content were decreased with increase in proportion of soymilk. Fat content decreased from 3.02 to 2.22 & total solid 16.88 to 15.45 with increasing the proportion of soymilk blend from 0 to 75 percent, whereas protein content and P<sup>H</sup> were increased with the increase in proportion of soymilk. Protein content was increased from 3.19 to 3.48 for increasing the percent of soymilk from 0 to 75. The results of sensorial quality evaluation apparently revealed that flavor, texture, color, taste and overall acceptability according to 9 – point hedonic rating method were considered better for 0 & 25 percent soymilk blend among all other treatments with soymilk, similarly results for yogurt with 50 percent soymilk was also found satisfactory. Benefit cost ratio calculated by using partial budgeting method was found to be 1.25:1, 1.48:1, 1.81:1 & 2.35:1 for 0, 25, 50 & 75 percent soymilk, respectively. The experiment shows that the blending of 75 percent market milk and 25 percent of soymilk reduces the cost of production of yogurt without deteriorating the physiochemical, microbial and sensory quality and was determined to be the best among the treatments.

**PROCESS OPTIMIZATION OF STERILIZED FLAVOR MILK PREPARED FROM COW MILK AND SOYMILK BLEND**

**Kishor Singh and Krishna Gopal Shrestha**

An experiment was conducted with the aim of investigating the appropriate level of inclusion of soymilk in blending with cow's milk in manufacturing flavor milk. The experiment was conducted in Completely Randomized Design (CRD) with four treatments of 0, 25, 50 and 75 parts inclusion of soymilk at Dhumbarahi Dairy (DBD) Pvt. Ltd and Himalayan College of Agricultural Sciences and Technology (HICAST), Kalanki and each treatment was replicated three times. The result showed that the pH content was lower in the treatments having less proportions of soymilk and vice-versa ( $p < 0.01$ ). The treatments with 25% soymilk and 0% soymilk had significantly lower pH content than treatment having 75% soymilk. Fat, SNF and TS contents in all the treatments were same because it was standardized during the production process. The ash content of flavor milk manufactured from blending of different proportions of cows and soymilk have no significant differences. 100% cow milk had slightly higher ash content comparative to 50% and 25% cow milk. The acidity of flavor milk was significantly different ( $p < 0.01$ ) with each other. The acidity percent for the different treatments were in the range 0.12 to 0.15. Higher the proportion of soymilk - lowers the acidity and vice versa. Protein content also varied significantly ( $p < 0.001$ ) among each other. The blend having highest proportion of soymilk (75%) had shown highest protein content (4.11%) compared to other treatments. Higher the soymilk concentration higher the protein content because soymilk is the rich source of protein. Similarly, the coliform test was negative. The result of the sensorial quality test apparently revealed that body and texture were considered better for treatment with 0% soymilk. Flavor, color, taste and overall acceptability were considered better for treatment with 0% and 25% soymilk in the blend. Benefit cost ratio calculated by using partial budgeting method was increased in the higher levels of soymilk. The present experiment revealed that the blending of 25% soymilk with 75% cow milk reduces the cost of production of flavor milk without deteriorating the physicochemical, microbial and sensorial quality.

**STUDY ON THE EFFECT OF SOY AND CORN FLOUR ON THE CHICKEN NUGGET PRODUCTION**

**Rumina Maharjan and Pravin Man Shakya**

This study was conducted in September, 2015 with an objective of suitability of mixing different ingredients like wheat flour, soy flour and corn flour with chicken to have the best quality of nugget. Five different batches of chicken nuggets were

prepared mixing with 10% wheat flour (T1), 10% soy flour and 0% corn flour (T2), 6% soy flour and 4% corn flour (T3), 4% soy flour and 6% corn flour (T4) and 10% corn flour and 0% soy flour (T5) as binding agent. From the sensory evaluation, treatment T3 was found to be the best sample ( $p < 0.05$ ) for appearance, taste, texture, juiciness and overall acceptability. The proximate analysis showed the moisture content in the range of 40.83 to 41.77%, protein in the range between 27.1 to 28.23 %, fat content in range of 10.70 to 11.00% and total ash content in the range between 2.01 to 3.92%. The energy value of chicken nuggets was found in the range of 274 to 282 Kcal in each 100 g portion size. Likewise, water holding capacity results of chicken nugget ranged from 31.27-35.43%. The proximate values were more compatible with the standard value of chicken nuggets. The microbiological test showed that total plate count was in the range of Log 2.54 to 2.58 CFU/g, Yeast and Molds count in the range of Log 1.99 to 2.01 CFU/g in products, however the fecal coliform was absent in all the samples. The microbiological results showed a very low number of such microorganisms, which indicated high level of hygienic quality of chicken nuggets. From this study, the chicken nugget could be prepared in commercial scale with highly desirable sensory quality by mixing with 6% soy flour and 4% corn flour in recipe.

This publication is a collection of abstracts of thesis researches conducted at HICAST in 2015. This is the sixth volume of this journal. Relevant thesis can be consulted at HICAST Library, Kalanki for detailed information in relevant topics.

This volume has seven chapters, viz. agri- economics and business management, horticulture, plant breeding, plant protection, sustainable agriculture, veterinary science, and dairy / meat technology. Altogether abstracts of 5 dozen of researches conducted in the year 2015 are compiled in this volume. It is useful for the researchers, development agencies and workers as well as policy makers.



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