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RESEARCH ARTICLE

CHEMICAL PESTICIDES USE PATTERN OF CAULIFLOWER GROWERS IN NADIA DISTRICT OF WEST BENGAL

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ABSTRACT

Farmers who are cultivating vegetables, they are using maximum numbers and amount of pesticides compared to cereal crops per unit area. Plant protection is an exercise basically followed in any crop for control of insect-pests, diseases, weeds etc. to avoid economic losses. For proper application of pesticides –there are specific recommendations. Due to lack of awareness of farmers regarding those recommendations, they are using pesticides deviating its proper processes and considerations. As a result, they are facing health related problems. Keeping all these in view the present study was designed with objective to know the chemical pesticides use pattern of cauliflower growers in Nadia district of West Bengal. The present study was conducted in Nadia district of West Bengal. Nadia district was purposively selected for the study and Chakdah community development block of Kalyani sub division was randomly selected for the study. Rautari gram panchayat was selected randomly from all the gram panchayats of Chakdah community development block. Three villages namely Teghara, Ruppur and Rameswarpur was selected purposively as the villages were in close proximity. Complete enumeration of the farmers in the villages was attended. Farmers who were available up to three times were included in the sample. In this way 73 brinjal growers from Teghara, 62-pointed gourd growers from Ruppur and 69 cauliflower growers from Rameswarpur were selected for the study who grow crops in parcels of plots under bigger common field. But, in this present study, we considered only 69 cauliflower growers. Cauliflower crop was mainly cultivated on rabi season (97. 75%), hence, cauliflower is not a round the year crop. Majority of respondents (62. 32%) in the study area applied chemical pesticides on 8-15 days interval. At seedling stage of cauliflower crop, 68. 12 percent of respondents used 30-40 litres of water per bigha for spraying chemical pesticides. Whereas at mature stage of the crop, farmers (59. 42%) used 80-100 litres of water per bigha for spraying pesticides. Various damaging insect-pests of cauliflower were diamond back moth, tobacco caterpillar, tobacco butterfly, cauliflower aphid and white fly. Out of it, tobacco caterpillar was most harmful insect-pest and it was reported by cent percent (100%) of respondents. The major harmful diseases were downy mildew, watery soft rot and black spot. Out of it, downy mildew disease was most harmful and it was reported by 44. 93 percent of respondents. Insect-pests and diseases of cauliflower crop mainly attacked the crop at mature stage. Cauliflower growers used various pesticides with various doses to control insect-pests and diseases. Majority of respondents deviated from recommended, dose, time of application, interval of application, recommended amount of water for pesticides application and other major considerations due to their ignorance, puzzled state, economic consideration, negligence and others reasons. To avoid the unnecessary use of pesticides, regulations regarding the use or pesticides and proper verification of the procedure should be carried out. Creation of awareness on the basis of family-based training, sensitization through value and ethics-based capacity building and utilization of religious and community leaders in this regard may be useful to overcome the issue. Therefore, the base level extension agencies should take proper measures on the basis of findings of the study to make their further extension programme more effective and steps should be taken to change the perception of the cauliflower growers regarding the use of the chemical pesticides.

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INTRODUCTION

World population according to 30 June. 2025 is 8,231,613,070. Our population has become so large that the Earth cannot cope. It took until the early 1800s for the world population to reach one billion. Now we add a billion every 12-15 years. World 2025/26 total grains production is forecast at 2,376 million tonnes. The forecast for world cereal utilization in 2025/26 stands at 2 900 million tonnes. So, there is shortage of 533 million tonnes of food grains. India's population is estimated to reach 146 crores in 2025, continuing to be the highest in the world, according to a new UN demographic report. India's foodgrain production is 354 million tonne (MT) in 2024-25. While the population is likely to increase to more than 1. 6 billion before near-stabilization by 2030, the food demand is expected to rise up to ~ 400 million tonnes (MT) by the year 2050. When someone says "agriculture," we usually picture lush green fields, a hardworking farmer, maybe even a tractor ploughing through the soil. But did you know that agriculture contributes around 15-18% of India's GDP? That's no small number. And yet, this number doesn't even begin to cover the real impact of agriculture in the Indian economy. More than 50% of India's workforce is directly or indirectly employed in the agricultural sector. Agriculture also fuels several other sectors, like food processing, textiles, and even pharmaceuticals. Without agriculture, these industries would be standing on shaky ground. If you've ever eaten rice, worn cotton, or used turmeric in your skincare routine, you've already experienced the importance of agriculture in Indian economy firsthand.

The Indian economy is an agro-economy and depends highly on the agricultural sector. Despite just supporting the Indian Economy, the agricultural sector also supports the industrial sector and international trade in imports and exports. Although the contribution of the Agricultural Sector to the Indian Economy is reducing, it is the sector with the most number of people working in it around the country. Agriculture is the base of our economy, livelihood, life, culture and progress. Agriculture is so important in our country that without agriculture our country's existence will be a question mark. From Indus valley civilisation to till today (modern era), agriculture is our base, platform, hope, lifeline, dream and bedrock of every culture in India. Population of India over 140 crores to feed the huge mass, agriculture having no option. Estimated foodgrain production in 2024-2025 was 353. 95 million tonnes. Day by day in food production, we are becoming self-sufficient. To feed the ever-increasing population of our country agriculture is the last option and only one option. Generally, the three pillars of any country's development are agriculture sector, industrial sector and service sector. Our country India having also three sectors. Industrial sector of our country day by day prospering, service sector is performing better. Whatever the earning coming from industrial sector and service sector, that money is not enough to purchase foodgrains from other countries to feed the huge population. If we do that, suppose, other all development will stop. But, in our country agriculture is feeding the countrymen & whatever the earning coming form other two sector that is used to develop our country gradually. Hence, agriculture is not only base of our country but it is the atma of our country. Many economists say that what is the importance of keeping millions of foodgrains in food corporation. We can sell it and use that money for development & whatever we need food; we can purchase from other countries. Bur are you sure that other countries at the time of crisis periods i. e. natural disaster, epidemic etc. will sell the foodgrain to our country and in so huge amount. If they would not sell, whatever the situation will happen, lakhs or crores of people will die simply by starvation. So keeping millions of foodgrain in FCI is logical. So, why agriculture is so important for us and why it is *atma*, we can understand now. Plant protection may be defined as the adoption of measures to prevent damage to plants from pests, or to arrest, minimize or obliterate it, once it has occurred. It includes the use of physical, mechanical, cultural, biological, chemical and legal measures to control pests. Plant protection is an exercise basically followed in any crop for control of insect-pests, diseases, weeds etc. to avoid economic losses. Reports indicate that the losses range from 20-30% by each of the insect-pests, diseases and weeds, but on an overall estimation, about 30% average cumulative loss by them appears a fair estimate. This resulted in taking suitable control measures to keep these losses to the minimum (Muthuraman and Kumar, 2013). One of the important plant protection measures is the use of pesticides. The term pesticide encompasses all chemical substances used for the control of pests. According to usage they are classified as insecticides, fungicide, herbicide, molluscicides and antibiotics. Most pesticides are used to serve as crop protection products which in general, protect the plants from weeds, fungi, or insects. The economic implications of the crop damage and crop loss due to pest incidences have forced many Indian farmers to adopt frequent pesticide applications.

Pesticides are considered responsible for the agricultural growth as its benefits associated with improved crop yields. That is the reason behind extensive use of pesticides. It has taken place in the last few years. The unnecessary use of pesticide to meet the ever rising quest for higher profit has resulted in several ecological and environmental consequences as well as unsafe practices in farming sector. The percentage of pesticide used on vegetable crops in the country is regularly increasing for the years. From 13-14% of the total pesticide use in the 1990s (Sardana, 2001)it has reached to 21% in 2010-11. Vegetables are very common diet of the inhabitants of our country. As a result of this, the quality of vegetables we eat is a big factor regarding our health issues. So, we need to understand the pesticide use pattern followed by the vegetable growers. The use pattern will reflect the knowledge of the vegetable growers regarding the spraying mechanism, proper doses, time of spraying and time interval needed to be followed while spraying pesticides, awareness regarding type of damage; identification of pest and proper plant protection measures. Keeping all these in view, the present study is designed to have an assessment of chemical pesticides use pattern of cauliflower growers. Therefore, the objective was to know chemical pesticides use pattern of cauliflower growers in Nadia district of West Bengal.

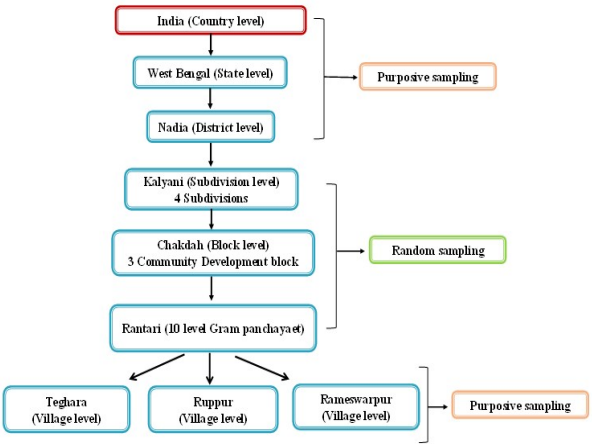
MATERIALS AND METHODS

The present study was conducted in Nadia district of West Bengal. Nadia district was purposively selected for the study. Under Kalyani sub-division of this district, Chakdah community development block was selected randomly for the study. Under this block, Rautari gram panchayat was selected randomly from all the gram panchayats. Under Rautari gram panchayat, three villages namely Teghara, Ruppur and

Rameswarpur were selected purposively as the villages were in close proximity. Complete enumeration of the farmers in the villages was attended. Farmers who were available up to three times were included in the sample. In this way 73 brinjal growers from Teghara, 62 pointed gourd growers from Ruppur and 69 cauliflower growers from Rameswarpur were selected for the study who grow crops in parcels of plots under bigger common field. In this way total 204 respondents were selected. But, in this present study, we considered only 69 cauliflower growers. The reason for selecting the area was • Nadia district is one of the leading vegetable growing areas of west Bengal. •

Farmers were quite habituated in handling different pesticides. • Acquaintance with the local people and language. • The respondents were highly cooperative and responsive. • The concerned areas were easily accessible in terms of transportation for the researcher. • The area was homogeneous in respect of socio-cultural and biophysical conditions which have bearings on crop cultivation in general and plant protection in particular. Pesticide consumption has close relationship with pest and disease infestation. Within a close proximity pest infestation is relatively homogeneous in nature. To maintain this homogeneity in micro climatic condition the areas with close proximity were selected. The data were personally collected by the researcher and the data were collected during November 2018 to March 2019.

Sampling design



RESULTS AND DISCUSSION

Pesticide usage pattern in cauliflower

Table 1. Season of cauliflower cultivation (N=69)

Season	Number of respondents cultivated	Percentage ofrespondents cultivated
Kharif	5	7. 25
Rabi	64	92. 75

Season of cauliflower cultivation: Table-1 depicts the season of cauliflower cultivation in the study area. From the study, it can be concluded that most of the respondents (92. 75%) cultivated the crop in rabi season and only a few respondents (7. 25%) cultivated the crop in kharif season. No respondent cultivated the crop in summer or pre-kharif season. From the study it is evident that cauliflower is not a round the year crop and market demand is on seasonal basis.

Cauliflower field

Cauliflower

Table 2. Interval of applying pesticides (N=69)

Days interval	Number of respondents Applied	Percentage of respondents applied
1 - 3	7	10. 14
4 - 7	11	15. 94
8 - 15	43	62. 32
More than 15	8	11. 59

Interval of applying pesticides: Table-2: describes the interval of using pesticides. Respondents of the study area applied chemical pesticides in the following days' interval- 1-3 days (10. 14%), 4-7 days (15. 94%), 8-15 days (62. 32%) and more than 15 days (11. 59%).

Farmer spraying pesticide on cauliflower crop

Table 3. Amount of water used for spraying pesticides (N=69)

Crop stage	Amount of water(litre) required for spraying(one bigha)	Number of respondent followed	Percentage of respondent followed
Seedling stage	30 – 40	47	68. 12
Maturity stage	80-100	41	59. 42

Amount of water needed for spraying chemical pesticides: Amount of water used while applying chemical pesticides is depicted in Table -3: Majority of the respondents (68. 12%) used 30-40 litres of water for applying of chemical pesticide at

seedling stage and at maturity stage, maximum number of respondents (59. 42%) used 80-100 litres of water for spraying chemical pesticides.

Table 4. Various insect-pests of cauliflower (N=69)

Insect-pests of Cauliflower	Number of respondents reported	Percentage of respondents reported
Diamondback moth	51	73. 91
Tobacco caterpillar	69	100
Tobacco butterfly	54	78. 26
Cauliflower aphid	46	66. 66
White fly	32	46. 37

Various insect-pests of cauliflower: Insect-pests generally occurring in the study area are in Table-4. Jakhar (2014), in his study revealed that cauliflower is severely damaged by multiple insect-pest complexes and it is a major limiting factor in cauliflower crop production. The main insects are diamond back moth (*Plutella xylostella*), tobacco caterpillar (*Spodotera litura)* etc. in India.

Table 5. Diseases of cauliflower (N=69)

Various diseases of Cauliflower	Number of respondents reported	Percentage of respondents reported
Downy mildew	31	44. 93
Watery soft rot or stalk rot	14	20. 29
Black spot or dark leaf spot	27	39. 13

Various diseases of cauliflower: The various diseases of cauliflower prevailing in the study area are given in Table-5. Kumar *et al*. (2016), in his study stated that vegetables are really susceptible to diseases and causes a huge yield loss due to these diseases.

Table 6. Attacking stages of insect-pests in cauliflower

Insect-pests	Attacking stages of crop
Diamondback moth	Early mature stage
Tobacco caterpillar	Early mature stage to mature stage
Tobacco butterfly	Mature stage
Cauliflower aphid	Mature stage
White fly	Mature stage

Table 7. Attacking stages of various diseases in cauliflower

Diseases	Attacking stages of crop
Downy mildew	Mature stage
Watery soft rot or stalk rot	Early mature stage to mature stage
Black spot or dark leaf spot	Early mature stage to mature stage

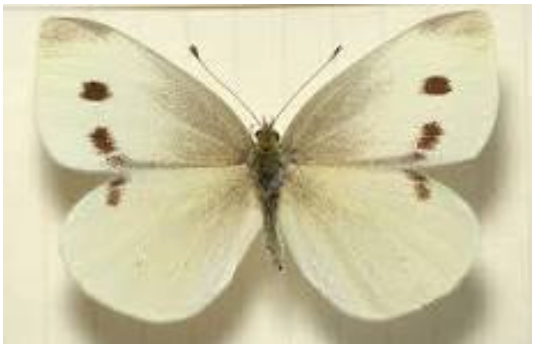
Cauliflower diamond back moth

Diamond back moth (*Plutella xylostella*): The various pesticides along with doses used to control the insect are in Table-8. It is really a very serious pest of cauliflower. The tiny caterpillars bite holes by feeding on the leaves giving a short hole effect all over the leaves. In dry season, they cause serious damage.

The moth is greyish brown with narrow wings and pale white markings along the back of the forewings which form a diamond shaped pattern when folded.

Cauliflower tobacco caterpillar

Tobacco caterpillar (*Spodoptera litura*): The pesticides used and doses applied to control the pest are presented in Table-9. These caterpillars feed voraciously on the leaves, shoots and fruits at night and become isolated at the later stage of the growth. The pest is confined to nursery beds and is also classed as cutworm.



Cauliflower butterfly

Cauliflower butterfly (*Pieris brassicae*): The pesticides used and doses applied to control the pest are in Table-10. The caterpillars feed on the leaves, shoots and pods and after growing up, they disperse to various parts of the plants. Starting to feed from the margin of leaf they proceed to the centre. The leaf and plant in a whole may be stripped resulting in poor yield and quality of produce.

Cauliflower aphid

Table 8. Chemical pesticides used to control diamond back moth (N=51)

Brand Name	Chemical name	Number of respondents adopted	Percentage of respondents adopted	Dose applied (per litre of water)
Coragen	Chlorantraniliprole 18. 5% SC	7	13. 73	0. 5-1 ml.
Ekalux	Quinalphos 25 EC	11	21. 57	2-6 ml
Regent SC	Fipronil 5 SC	8	15. 69	1-2 ml
Carina	Profenophos 40 EC+Cypermethrin 4 EC)	9	17. 65	1. 3-2. 6 ml
Emstar 5	Emamectin benzoate 5% SG	9	17. 65	0. 5-1 gm.
Fluton	Flubendiamide 20% WG	7	13. 73	1 gm.

Table 9. Chemical pesticides used to control tobacco caterpillar (N=69)

Brand Name	Chemical name	Number of respondents adopted	Percentage of respondents adopted	Dose applied (per litre of water)
Delegate	Spinetoram 11. 7 SC	17	24. 64	1 ml.
Hamla	Chlorpyriphos 50 EC+ Cypermithrin 5 EC	21	30. 43	1-2 ml.
Rimon	Novaluron 10 EC	12	17. 39	0. 5- 1 ml.
Kirtap	Cartap Hydrochloride50 SP	14	20. 29	1 – 2 gm.
Dursban	Chlorpyriphos 20EC	5	7. 25	2. 5-5. 0 ml

Table 10. Chemical pesticides used to control cauliflower butterfly (N=54)

Brand Name	Chemical name	Number of respondents adopted	Percentage of respondents adopted	Dose applied (per litre of water)
Lancer gold	Acephate 50 SP+ Imidacloprid 1. 8 SP	23	42. 59	1. 5 gm.
Nuvan	Dichlorvos 76 SL	19	35. 19	0. 75 – 1 ml.
Hamla	Chlorpyriphos 50 EC+ Cypermithrin 5 EC	12	22. 22	1-2 ml.

Table 11. Chemical pesticides used to control cauliflower aphid (N=46)

Brand Name	Chemical name	Number of respondents adopted	Percentage of respondents adopted	Dose applied (per litre of water)
Ekka	Acetamiprid 20 SP	21	45. 65	0. 20 gm.
Ekalux	Quinalphos 25 EC	16	34. 78	2 – 6 ml.
Rogor	Dimethoate 30 EC	9	19. 57	2 ml.

Table 12. Chemical pesticides used to control white fly (N=32)

Brand Name	Chemical name	Number of respondents adopted	Percentage of respondents adopted	Dose applied (per litre of water)
Confidor	Imidacloprid 20 SL	9	28. 12	0. 2 – 0. 5 ml.
Token	Dinotefuran 20 SG	7	21. 88	0. 25 gm.
Asataf	Acephate 75 WP	12	37. 50	0. 75-1. 50 gm.
Met-505	Ethion	4	12. 50	1. 50 ml.

Table 13. Chemical pesticides used to control downy mildew disease (N=31)

Brand Name	Chemical name	Number of respondents adopted	Percentage of respondents adopted	Dose applied (per litre of water)
Krilaxyl-72	Metalaxyl 8%+ Mancozeb 64% WP	6	19. 35	2 gm.
Kavach	Chlorothalonil 75 WP	4	12. 90	2 gm.
Nativo	Tebuconazole+Trifloxystrobin 75WG	9	29. 03	2 gm.
Blue copper	Copper Oxychloride 50 WDP	7	22. 58	3 – 4 gm
Ridomil Gold	Metalaxyl - 4% and Mancozeb - 64% (68% WP)	5	16. 13	2 gm.

Table 14. Chemical pesticides used to control watery soft rot or stalk rot disease (N=14)

Brand Name	Chemical name	Number of respondents adopted	Percentage of respondents adopted	Dose applied (per litre of water)
Blitox	Copper Oxychloride 50 WDP	8	57. 14	3 – 4 gm.
Sprint	Mancozeb 50+Carbendazim 25 WS	2	14. 29	1 – 2 gm.
SAAF	Carbendazim 12WP + Mancozeb 63WP	4	28. 57	1 – 2 gm.

Table 15. Chemical pesticides used for controlling black spot or dark leaf spot disease (N=27)

Brand Name	Chemical name	Number ofrespondents adopted	Percentage of respondents adopted	Dose applied (per litre of water)
Amistar top	Azoxytrobin+Difenoconazole	12	44. 44	2 gm.
Indofil Z-78	Zineb 75 WP	9	33. 33	1-2 gm.
Bavistin	Carbendazim 50 WP	6	22. 22	2 -3 gm.

Cauliflower aphid *(Brevicoryne brassicae)*: The pesticides used and doses applied to control the pest are presented in Table-11. The nymphs and adults suck sap from the tender parts of the plants. In cauliflower, the inner space of the head is filled by the aphids, thus making the vegetables unmarketable.

White fly

White fly (*Aleyrodes proletella*): The pesticides used and doses applied to control the pest are in Table-12. This is a minor pest of cauliflower. The larvae feed on the underside of the leaves and cause white or yellow patches. Black mouldy growth develops on the honey dew secreted by the pest.

Cauliflower downy mildew disease

Downy mildew disease (*Peronospora parasitica*): The chemical controls followed by the respondents are in Table-13. The symptoms of the disease includes purplish brown spots on the under surface of the leaves. The upper surface of the leaf on the lesion becomes tan or yellow. Downy fungal growth usually appears on the under surface of the leaves.

Watery soft rot

Watery soft rot or stalk rot disease (*Sclerotinia sclerotiorum*): The chemical controls followed by the respondents are depicted in Table-14. The symptom includes spots on the leaves, particularly on the base of the petioles and passes in the adjoining parts of the stem on which large, greyish-white, elliptical spots arise. Sometimes, the whole surface of the stem is affected.

Black spot or dark leaf spot disease

Black spot or dark leaf spot disease *(Alternaria brassicae)*: Chemical control measures followed by the respondents are given in Table-15. The symptom of the disease include small, lighter dark coloured leaf spots spreading rapidly to form circular lesion upto 1 cm in diameter or even more. The spots enlarge in concentric rings. The fungus generally appears as bluish growth in the centre during humid weather.

CONCLUSION

Cauliflower crop was mainly cultivated on rabi season (97. 75%) and in kharif season only 7. 25 percent of respondents cultivated it. No respondent cultivated the crop in summer or pre-kharif season, hence, cauliflower is not a round the year crop. Majority of respondents (62. 32%) in the study area applied chemical pesticides on 8-15 days interval. Other intervals were 1-3days (10. 14%), 4-7 days (15. 94%) and more than 15 days (11. 59%). At seedling stage of cauliflower crop 68. 12 percent of respondents used 30-40 litres of water per bigha for spraying chemical pesticides. Whereas at mature stage of the crop, farmers (59. 42%) used 80-100 litres of water per bigha for spraying pesticides. Various damaging insect-pests of cauliflower were diamond back moth, tobacco caterpillar, tobacco butterfly, cauliflower aphid and white fly. Out of it, tobacco caterpillar was most harmful insect-pest and it was reported by cent percent (100%) of respondents. The major harmful diseases were downy mildew, watery soft rot and black spot. Out of it, downy mildew disease was most harmful and it was reported by 44. 93 percent of respondents. Insect-pests and diseases of cauliflower crop mainly attacked the crop at mature stage. Chemical pesticides used by cauliflower growers to control diamond back moth were Coragen (13. 73%), Ekalux (21. 57%), Regent SC (15. 69%), Carina (17. 65%), Emstar-5 (17. 65%) and Fluton (13. 73%). Tobacco caterpillar was controlled by applying pesticides Delegate (24. 64%), Hamla (30. 43%), Rimon (17. 39%), Kirtap (20. 29%) and Dursban (7. 25%). Chemical pesticides used to control cauliflower butterfly were Lancer gold (42. 59%), Nuvan (35. 19%) and Hamla (22. 22%). Out of it, Lancer gold was quite effective chemical compare too other two chemicals. Chemical pesticides used by respondents to control cauliflower aphid were Ekka (45. 65%), Ekalux (34. 78%) and Rogor (19. 57%). Nearly half of respondents in the study area reported that Ekka was quite effective compare to other two chemicals Ekalux and Rogor. White fly was also a problematic insect-pest of cauliflower crop. Chemical pesticides used to control white fly were confidor (28. 12%), Token (21. 88%), Asataf (37. 50%) and Met-505 (12. 50%). Krilaxyl-72 (19. 35%), Kavach (12. 90%), Nativo (29. 03%), Blue copper (22. 58%) and Ridomil gold (16. 13%) were the chemical pesticides to control downy mildew disease in cauliflower crop. Chemical pesticides used by respondents to

control watery soft rot or stalk rot disease were Blitox (57. 14%), Sprint (14. 29%) and SAAF (28. 57%). Blitox was the mostly used chemical pesticide. Amiston top (44. 44%) was the mostly used chemical pesticide against black spot disease of cauliflower. Other two used chemical pesticides were Indofil Z-78 (33. 33%) and Bavistin (22. 22%). Majority of respondents deviated from recommended dose, time of application, interval of application, recommended amount water for pesticides application and other major considerations due to their ignorance, puzzled state, economic consideration, negligence and others reasons. Plant protection technology is a complex technology. It is well -known to all that a technology how much complex, its' rate of adoption is less that much extent. Crop protection has several aspects for adoption and application, but, all the farmers do not follow all recommendation strictly and accurately, hence, many of farmers did not get proper result. May be farmers cannot understand or they have no time to follow every instruction strictly, may be their poor economic conditions etc. In this respect following things have to be done to enhance the adoption rate of farmers in general and here cauliflower growers particularly. (1) Leaflet, folder, pamphlet, booklet on plant protection aspects should be distributed among farmers in huge amount either in any training programme or kisan mela etc. (2) Crop season-wise plant protection aspects should be broadcasted in radio. (3) Crop season-wise plant protection aspects should be telecasted in T. V. (4) Crop season-wise news on plant protection aspects should be published in local newspaper. (5) Various small duration videos on plant protection aspects of various crops should be uploaded in YouTube. (6) Number of short duration and long duration training on plant protection of various crops should be conducted for farmers. (7) Agriculture input retailers should advice properly on plant protection aspects on various crops to farmers keeping their profit motive attitude quite aside. (8) Progressive farmers should be more responsible to other farmers of their locality. (9) Upto class-X, make agriculture a compulsory subject in schools both public and private. (10) Agricultural universities should conduct more farmers' meeting in several villages on the basis of seasonal crop especially plant protection aspects. (11) Role of agricultural development officer (ADO) must be reoriented emphasising plant protection. (12) Role of krishiprayuktisahayak (KPS) must be reoriented centering plant protection aspects. (13) Overall, all stakeholders of agriculture must have special attention on plant protection aspects, this is the filed where farmers really need help.

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