**Perception of Vegetable Growers on Health Hazards Due to Uses of Pesticide**

**Abstarct:**

Vegetables, though highly perishable, are nutritionally valuable crops that contribute significantly to India’s agricultural economy, including in the state of Gujarat. This study was carried out in Banaskantha district, a prominent vegetable-growing area of Gujarat, with a specific focus on potato and tomato cultivation. A total of 150 farmers were selected using a multi-stage sampling technique, comprising 75 potato growers and 75 tomato growers. Three talukas were purposively selected, and from each taluka, five villages were randomly chosen. In each village, ten farmers—five cultivating potatoes and five cultivating tomatoes—were randomly selected for the survey. Primary data were gathered through personal interviews conducted at the respondents’ homes and fields. The study aimed to explore the farming practices, perceptions, and key challenges faced by vegetable growers in the region.

**Keywords**: Health, Hazards, Perceptions, Vegetables and Farmers

**Introduction:**

In India, agriculture contributes approximately 20.19% to the Gross Domestic Product (GDP) and employs nearly 60% of the national workforce (Anonymous, 2020). The country ranks as the second-largest producer of vegetables globally, accounting for around 8.6% of global vegetable production, despite utilizing only 2% of the world’s total cropped area. In 2020–21, India produced 191.77 million metric tonnes of vegetables over 10.35 million hectares, with exports valued at ₹4969.73 crores (Anonymous, 2020). Vegetable cultivation has become a significant livelihood strategy for smallholder farmers, playing a key role in poverty alleviation by generating substantial income for both cultivators and agricultural laborers. However, rising demand and increasing competition in vegetable markets have prompted many farmers to intensify their use of organophosphate pesticides to enhance productivity (Choudhary et al., 2014). As a result, pesticide use has become deeply embedded in agro-ecosystems, despite its documented environmental and health risks (Dey et al., 2013). The excessive and unregulated application of pesticides has led to detrimental consequences, including the loss of beneficial insect populations, secondary pest outbreaks, the emergence of pesticide-resistant pests, and serious health hazards (Kumar et al., 2024). Given this widespread reliance on chemical pesticides, it is imperative that vegetable growers are adequately informed about their harmful effects on human health, soil quality, water resources, and the broader environment (Kumar et al., 2024). Understanding farmers’ awareness of pesticide-related hazards is critical for encouraging the safe and judicious use of these chemicals. Training and capacity-building initiatives are essential for promoting new agricultural practices and increasing farmers’ understanding of environmental and health safety concerns (Kumar et al., 2024). In the context of this study, "knowledge" refers to the level of awareness and understanding that vegetable growers possess regarding the risks associated with pesticide use.

**Methodology:**

The present study was carried out in the Banaskantha district of North Gujarat, selected due to its distinction as the leading vegetable-producing area, covering 91,405 hectares, as reported by the Department of Horticulture, Banaskantha. The district comprises fourteen talukas, of which three were purposively chosen based on their significant cultivation of potato and tomato crops, collectively spanning 65,974 hectares. From each of these talukas, five villages were randomly selected. In each village, ten vegetable growers were randomly chosen—comprising five tomato growers and five potato growers—resulting in a total sample size of 150 respondents, with 75 representing each crop group. A structured interview schedule was designed to encompass all pertinent independent and dependent variables. Data were collected through personal interviews, emphasizing the respondents’ knowledge of the health hazards associated with pesticide use and their perspectives on alternative pest control methods. The collected responses were compiled into a master sheet, and suitable statistical techniques—including frequency, ranking, arithmetic mean, standard deviation, and weighted mean score—were employed to analyze and interpret the findings.

**Result and Discussion:**

**Socio-Economic Profile of Farmers**

The socio-economic profile of the respondents, as detailed in Table 1, indicates that a considerable share (49.33%) belonged to the middle-aged category, corroborating the findings of Jhansi and Kalal (2022). In terms of educational attainment, 33.33% had completed primary education, followed by 28.67% with secondary education, which is in line with the observations of Shinde et al. (2021). Regarding landholding status, 49.33% of the respondents were classified as semi-medium farmers (Chaudhary, 2013; Dhepe, 2014). With respect to annual income, 47.33% reported earnings of up to ₹50,000. In terms of social participation, 42.67% were affiliated with at least one organization, while 25.33% reported no involvement in any such groups. Data on farming experience revealed that 54.67% of the respondents had a medium level of experience (Rabari, 2006). Extension contact was also found to be moderate, with 56.00% of vegetable growers exhibiting a medium level of participation in extension activities (Chaudhary, 2010). Furthermore, 66.67% of respondents accessed agricultural information through medium-level sources (Shinde, 2017), and 64.00% had a moderate degree of exposure to mass media (Chaudhary, 2010; Upadhyay, 2010). A medium level of scientific orientation was observed among 58.00% of the respondents (Choudhary, 2010), while 60.67% demonstrated a medium level of risk orientation (Patel et al., 2012).

**Table 1: Distribution of respondents based on socio-economic profile. (n= 150)**

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No.** | **Variable** | **Numbers** | **Per cent** |
| 1. Age
 |
| 1. | Young age group (Up to 35 yr) | 40 | 26.67 |
| 2. | Middle age group (Between 36 to 50 yr)  | 74 | 49.33 |
| 3. | Old age group (Above 50 yr)  | 36 | 24.00 |
| 1. Education
 |
| 4. | Illiterate  | 25 | 16.66 |
| 5. | Primary education (1 st to 8thstd.)  | 50 | 33.33 |
| 6. | Secondary education (9 th to 10thstd.)  | 43 | 28.67 |
| 7. | Higher secondary education (11 th and 12thstd.)  | 19 | 12.67 |
| 8. | Graduation and Post -graduation and above  | 13 | 08.67 |
| C. Land Holding |
| 9. | Marginal (Up to 1.00 ha)  | 30 | 20.00 |
| 10. | Small (1.0 to 2.0 ha)  | 34 | 22.67 |
| 11. | Semi medium (2.0 to 4.0 ha)  | 74 | 49.33 |
| 12. | Medium (4.0 to 10.0 ha)  | 12 | 08.00 |
| 13. | Large (more than 10.0 ha)  | 00 | 00.00 |
| D. Annual Income |
| 14. | Up to Rs. 50000/ -  | 33 | 22.00 |
| 15. | Rs. 50001 to 100000/ -  | 71 | 47.33 |
| 16 | Above Rs. 100001/ -  | 46 | 30.67 |
| E. Social Participation |
| 16 | No membership  | 38 | 25.33 |
| 17 | Membership in one organization  | 64 | 42.67 |
| 18 | Membership in more than one organization  | 34 | 22.67 |
| 19 | Holding position in organization  | 14 | 09.33 |
| F. Farming Experience |
| 20 | Low level of farming experience  | 35 | 23.33 |
| 21 | Medium level of farming experience | 82 | 54.67 |
| 22 | High level of farming experience  | 33 | 22.00 |
| G. Extension Participation |
| 23 | Low extension participation  | 29 | 19.33. |
| 24 | Medium extension participation  | 84 | 56.00 |
| 25 | High extension participation  | 37 | 24.67 |
| H Source of Information |
| 26 | Low source of information  | 22 | 14.66 |
| 27 | Medium source of information  | 100 | 66.67 |
| 28 | High source of information  | 28 | 18.67 |
| 1. Mass Media Exposure
 |
| 29 | Low mass media exposure  | 25 | 16.67 |
| 30 | Medium mass media exposure  | 96 | 64.00 |
| 31 | High mass media exposure  | 29 | 19.33 |
| J. Scientific Orientation |
| 32 | Low scientific orientation  | 29 | 19.33 |
| 33 | Medium scientific orientation  | 87 | 58.00 |
| 34 | High scientific orientation  | 34 | 22.67 |
| K. Risk Orientation |
| 35 | Low risk orientation  | 37 | 24.66 |
| 36 | Medium risk orientation  | 91 | 60.67 |
| 37 | High risk orientation  | 22 | 14.67 |

Table 2 presents the distribution of respondents according to their level of perception concerning the hazardous effects of pesticides. The results reveal that a majority (61.33%) of vegetable growers exhibited a medium level of perception, while 22.00% had a low perception level and only 16.67% demonstrated a high level of perception. The mean perception score was 10.57, with a standard deviation of 2.48, indicating a generally moderate awareness among the respondents. These findings underscore a notable deficiency in high-level awareness regarding pesticide hazards among vegetable growers in Banaskantha district. Although a considerable proportion of respondents fall under the medium category, the relatively low percentage with high perception (16.67%) emphasizes the need for targeted awareness campaigns and educational interventions. Farmers with low perception levels are more likely to practice unsafe pesticide handling, thereby elevating risks to human health and the environment. These observations are consistent with previous studies; Raghunandan et al. (2020) and Rohtash (2020) similarly reported medium awareness levels among vegetable growers in Karnataka. Additionally, Patel et al. (2018) highlighted that limited access to training and extension services significantly contributes to the low knowledge levels among small and marginal farmers.

A considerable proportion of farmers falling into the medium perception category may be due to their partial exposure to awareness initiatives facilitated by agricultural extension services, media, and peer networks. In contrast, the limited number of respondents exhibiting a high level of perception indicates that current communication and training strategies may be insufficient in conveying comprehensive knowledge about the risks associated with pesticide use. This highlights the need for more intensive, participatory learning approaches. As emphasized by Kumari and John (2021), hands-on demonstrations and community-based extension methods are crucial for enhancing farmers' awareness and promoting safer pesticide practices.

**Table 2: Distribution of respondents according to their level of perception about health hazards of pesticides**

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Category** | **Respondents** |
| **Frequency** | **Per cent (%)** |
| 1 | Low level of perception | 33 | 22.00 |
| 2 | Medium level of perception | 92 | 61.33 |
| 3 | High level of perception | 25 | 16.67 |
| Total | 150 | 100.00 |
| Mean=10.57 SD=2.48 |

The study evaluated the knowledge level of vegetable growers regarding the harmful effects of pesticide use across five key areas, as presented in Table 3 through Weighted Mean Scores (WMS) and corresponding ranks. The highest awareness was observed for the statement "Do you know about health hazardous effect on human health?" (WMS = 2.20; Rank I), indicating that most respondents were relatively more informed about the direct impact of pesticides on human health. This finding is consistent with Sharma et al. (2019), who reported that farmers tend to prioritize personal health risks over environmental or agronomic concerns. The second-highest awareness was noted for knowledge about plant protection equipment (WMS = 2.09; Rank II), suggesting a moderate understanding of the importance of personal protective gear. However, over a quarter of respondents lacked awareness in this area, highlighting a need for improved outreach on safety practices, as similarly observed by Gurung et al. (2020), who reported limited PPE use among smallholder farmers due to accessibility and awareness constraints. Awareness of pesticide phytotoxicity (WMS = 2.06; Rank III) indicates a fair understanding of its potential harm to crops. In contrast, knowledge about the negative effects of pesticides on soil health (WMS = 1.93; Rank IV) and the specific diseases caused by pesticide exposure in humans (WMS = 1.70; Rank V) was comparatively lower. These results underscore a critical knowledge gap concerning the broader environmental and long-term health impacts of pesticide use.

This gap in knowledge may be attributed to the orientation of current extension activities, which primarily highlight the short-term benefits of crop protection, often overlooking the long-term ecological and health consequences. Similar findings were reported by Patel et al. (2018), Kumar et al. (2024), and Kumari and John (2021), who noted that farmers frequently undervalue the cumulative and chronic impacts of pesticide use on soil health and human well-being.

The overall low to moderate WMS values across all five indicators highlight the urgent need for enhanced awareness campaigns, with special emphasis on the lesser-known but equally critical areas such as soil health degradation and chronic illnesses caused by pesticide exposure.

**Table 3: Respondents' Knowledge Regarding Harmful Effects of Pesticides**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No** | **Statements** | **Know** | **Somewhat know** | **Don’t know** | **Total Score** | **WMS** | **Rank** |
| 1 |  Do you know about phytotoxicity of pesticide on plant | 43 | 73 | 34 | 309 | 2.06 | III |
| 2 |  Do you know about health hazardous effect on human health | 45 | 90 | 15 | 330 | 2.20 | I |
| 3 | Do you know different disease caused by pesticide in human being | 29 | 47 | 74 | 255 | 1.70 | V |
| 4 |  Do you know about different plant protection wears to prevent pesticide contamination | 42 | 80 | 28 | 314 | 2.09 | II |
| 5 |  Do you know adverse effect of pesticide in soil health | 38 | 64 | 48 | 290 | 1.93 | IV |

**Conclusion:**

The study revealed that the majority of vegetable growers in Banaskantha district possess a medium level of perception regarding the hazardous effects of pesticide use, with a significantly smaller proportion demonstrating high awareness. While farmers showed relatively better knowledge about the direct health hazards of pesticides, their understanding of environmental impacts—such as soil degradation and chronic human diseases—remains limited. This indicates a critical knowledge gap that can hinder the adoption of safe and sustainable pesticide practices. The findings underscore the need for targeted awareness initiatives, capacity-building programs, and improved access to protective equipment. Strengthening extension services with participatory and community-based approaches can enhance farmers’ understanding of both immediate and long-term pesticide hazards, ultimately promoting safer farming practices and environmental stewardship.

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