Online ISSN 2582-368X

AGRIALLIS

SCIENCE FOR AGRICULTURE AND ALLIED SECTOR

A Monthly Magazine

VOLUME 4,
ISSUE 7
JUL. 2022

www.agriallis.com

Growing seed

Editorial Board

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AGRIALLIS
Science for Agriculture and Allied Sector: A Monthly Magazine

Article Id
AL04142

ENTREPRENEURIAL BEHAVIOUR IN SECONDARY AGRICULTURE

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Secondary Agriculture includes "all practices, approaches and process which significantly adds value to the original produce by using suitable and efficient technologies, market dynamics and consumer preferences". We have promising examples of secondary agriculture like oil from rice bran, starched sugar from corn, essential oil from turmeric, milk and protein from soybean, industrial chemicals and bio-fuel from sugarcane and ligno-cellulosic biomass, fiber board from rice straw, high value animal by products, in addition to aromatic extract from medicinal and herbal plants.

So, to say, promoting secondary agriculture has direct relation with sustainable agriculture and increasing productivity which aim to connect primary, secondary and tertiary sectors by using all factors of production, such as land, capital and labour—contributing to primary agriculture production, capturing 'value' in primary agricultural activities, and generating additional income at the enterprise level.

The real sense of secondary agriculture was understood when the Ashok Dalwai Committee submitted its report on "adding value to primary agriculture and building agricultural enterprises in rural India" through "farm-linked activities and secondary agriculture" in February 2018. The committee has defined secondary agriculture as a production activity at the enterprise/farm level, and it devised a four-pronged strategy:

- Sustainability of agricultural production
- Monetisation of farmers' produce
- Strengthening of extension advisory services
- Recognizing agriculture as an enterprise, and enabling it to operate with major structural transformation

This four-fold strategy for secondary agriculture has drawn the attention of development professionals, agribusiness academics and experts, and policymaking bodies. Secondary agriculture, as is defined, can help drive the growth of primary agriculture to promote the agrarian economy, and three avenues have been identified that adequately help utilize all forms of capital, human resources, transferable technology, organizational and infrastructural capabilities, and risk orientation.

- Type A: Primary and secondary value addition to existing production system
- Type B: Alternative enterprises but linked to rural off-farm and landless activities.
- Type C: Enterprises that thrive on crop residues and agro-waste materials.

Type A can be achieved by improving livelihood promotion strategies that are implemented by farmer-based/community-based organizations. Linking farmers with the market through collection, aggregation and assaying/grading of agricultural produce can help them in value promotion and appropriation. Collectivisations, cluster farming, financial literacy, commodity marketing skills are prominent to structure and make functional these avenues.

Type B is based on utilization of alternative enterprises to primary agriculture, but is associated with rural off-farm activities. For example, poultry, bee-keeping, duck farming, quail farming and animal husbandry practices are off-farm enterprises that can be promoted as part of the integrated farming system. Integrated farming system is a very unique approach to

Type C refer to enterprises that strive on crop residues, or by-products of primary agriculture. For example, mushroom from paddy straw/arhar stalk, after recovering sugar from cane, cane can be used as bagasse for molasses production. Similarly, cotton stalk and seed (after ginning) can be used for de-oiled cake preparation or utilised in the secondary/tertiary sector.Even preparing wooden furnitures from bamboo residues,arhar stalk, handicrafts and ethnic, fashionable jewelry from banana fibers, herbal gulal from vegetable wastes,medicinal oil from turmeric waste dried leaves and so many.

To promote agricultural entrepreneurship or agricultural enterprises, there is recognition of priority sector status for institutional credit; low-cost skilling and knowledge-based exposure of farm communities; specialised extension services for enterprises owned by females; priority under rural electrification objectives; fast-track procedures to avail benefits under the

ongoing central sector schemes; and label geographical indicators to products of village-scale secondary agriculture. Apart and above all this understands entrepreneurial behavior.

Recent Remarks

- ✓ The 52 percent workforce engaged in agriculture requires a booster dose for revamping its economy and this can happen only through post harvest sector, which is nothing but secondary agriculture," these remarks were made by Secretary, DARE and Director General ICAR, Dr. S. Ayyapan during the brain storming session on Post Harvest Technology & Value Addition held at National Agricultural Science Complex (NASC) Complex in December 2013.

In This Context, Entrepreneurial Behaviour is Understood as

(i) Information Seeking: This aspect of behavior relates to acquiring more and more information based on experimental results. The research and extension in Agriculture revolves round data, so it is very important that entrepreneurs need to be inquisitive.

(ii) Information Processing: This aspect hints at the intelligent processing of information gathered to come out with fruitful strategies for successful interventions.

(iii) Information Disseminating: After processing of information, the piled up information is disseminated to the outer sources, which will be beneficial for the business and the new initiatives.

Entrepreneurship, due to its complex nature and multidisciplinary characteristics, is the focus of many disciplines, including economics and management. It can be assumed that entrepreneurship is combined with the practice of functioning of small enterprises, whose owners, as well as management personnel, reveal attitudes, behavior, and personality traits conducive to expanding a business and conducting changes. Entrepreneurial behavior can be defined as a set of behaviors that an individual possess and which enables him to innovate and/or improve upon existing ideas to design and market a product or service effectively to gain a competitive edge. Entrepreneurship is still identified, as it was in the first years after transformation, with an effective way of thinking and acting, with the intention of making independent economic decisions and with the ability to act rationally and achieve tangible benefits.

Conditions Affecting the Development of Entrepreneurship of Farmers

A. Factors determining entrepreneurial behaviour

- Individual committing to(creativity, optimism, and diligence)
- Competition on the market (market niches, resources and action, fair competition)
- The state of farm equipment in machinery, equipment and buildings and structures
- Possibilities of obtaining financial resources (micro credit, bank loans and own existing resources)

B. Factors stimulating entrepreneurship

- Farm equipment with machinery, equipment and buildings and structures
- The multifunctional nature of rural areas
- Practical knowledge and ability to draw conclusions from acquired experience
- Searching for new opportunities and niches
- Ability to recruit new team members

C. Factors supporting entrepreneurship

- Socioeconomic and psychological strength
- Level of education and qualifications of agricultural producers
- Level of technical infrastructure development
- Employment and involvement of the farmers
- Publicity of production for market entry

D. Factors with an indirect impact on the development of entrepreneurship

- Facilitates the initiating ventures or agri-startups
- Support assistance
- Innovativeness
- Age structure of growers

Going further, one can agree with the opinion that entrepreneurship defines attitudes and auction process for the development of existing activities or for the emergence of new business ventures, based on seeking market opportunities, as well as management strategies and the management of its implementation. Rural development programmes often make little

references to position of entrepreneurial orientation in rural areas and their links to the entrepreneurial behaviour and rural livelihood.

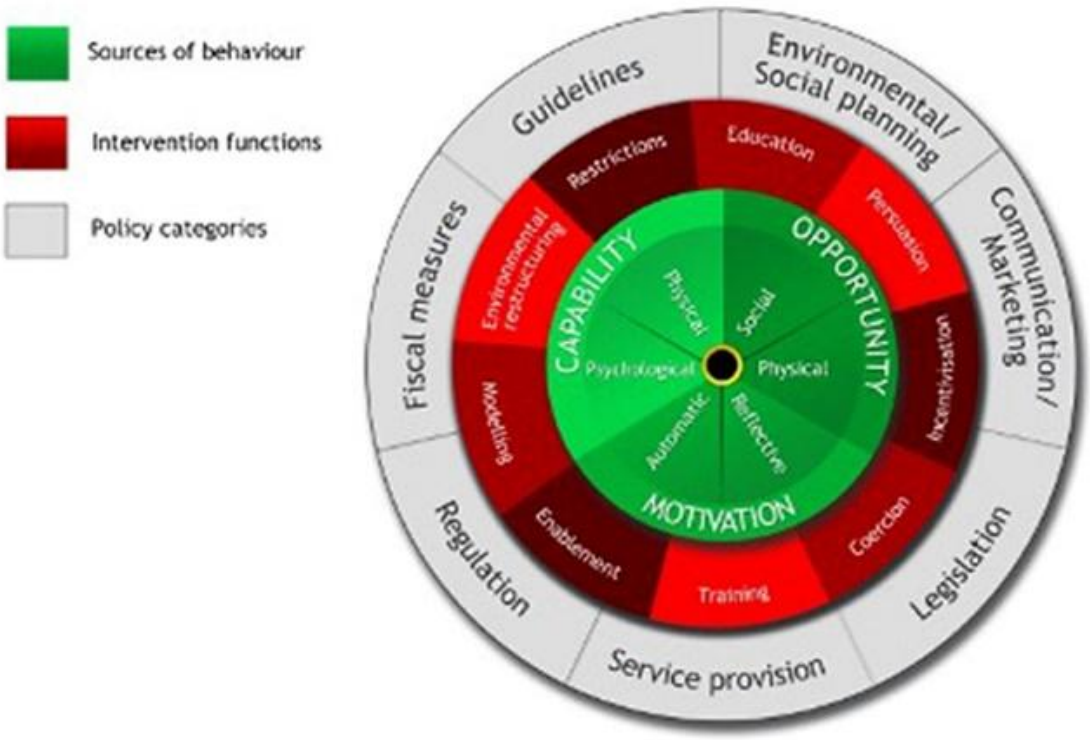

Fig. Behaviour Change wheel

Conclusion

Looking into the emerging areas of agriculture entrepreneurship in the current days, entrepreneurial behavior parameters like innovativeness, achievement motivation, decision making ability, risk orientation, coordinating ability, information seeking behavior, self-confidence, planning ability, and cosmopoliteness rules the ecosystem. It is also often being observed and inferred that entrepreneur in agriculture and allied sectors possess low to medium level of education, grown from grassroots, average household annual income, and possession of land and livestock holding, farming experience, training exposure, participation in various social and extension activities. Secondary agriculture is the immediate shift, that Indian agriculture needs as of now. It assumes prominence with the announcement of the goal of doubling farmers' incomes. The term 'secondary' has a bearing on climate change adaptation and its mitigation, small farm viability and profitability, food security, nutrition, sustainable utilization of natural resources, and optimal usage of produce from farm incomes.As we all know that farmers behavior has a reasoned action and influences farmers

decision making process, so understanding them along with their processes as per the change wheel is pertinent.

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AGRIALLIS
Science for Agriculture and Allied Sector: A Monthly Magazine

Article Id
AL04143

BIOFORTIFICATION: RAISING THE NUTRIENT VALUE OF CROP

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Around two billion people across the world suffer from a type of hunger known as "hidden hunger," which is caused by an inadequate intake of essential micronutrients in the daily diet despite increased food crop production (Gould, 2017). The green revolution undoubtedly increased the global agricultural production, but sadly the focus for nutrient content remained unattended for a large amount of time, leading to a rapid rise in micronutrient deficiency in major agricultural products like food grains. This has lead to micronutrient malnutrition. Gradually a shift in focus from higher production food crops to nutrient-rich food crops in sufficient quantities is gaining momentum, thereby helping people combat micronutrient malnutrition, especially in poor and developing countries, where diets are dominated by micronutrient-poor staple food crops.

"Biofortification" or "biological fortification" refers to nutritionally enhanced food crops with increased bioavailability to the human population that are developed and grown using modern biotechnology techniques, conventional plant breeding, and agronomic practices. Biofortification of different crop varieties offers a sustainable and long-term solution in providing micronutrient-rich crops to people. Essential micronutrients using biofortified crops are deployed to consumers through traditional practices used by agriculture and food trade which provides a feasible way of reaching undernourished and low income group families with limited access to diverse diets, supplements, and fortified foods. From an economic viewpoint, biofortification is a one-time investment and offers a cost-effective, long-term, and sustainable approach in fighting hidden hunger because once the biofortified crops are developed; there are no costs of buying the fortificants and adding them to the food supply during processing (Bouis, 1999 and Hefferon, 2016). Furthermore, in the next few

decades, a major population increase might take place in the developing world and with the changing climatic conditions; achieving food security will pose a greater challenge (Bazuin et al., 2011). Thus, organizations such as the World Health Organization and the Consultative Group on International Agricultural Research (CGIAR) have included the development of nutritionally enhanced high-yielding biofortified crops as one of their main goals (Bouis, 2000).

Approaches to Enhance Nutrient Content

Various avenues currently in practice to achieve nutritional security are non-genetic and genetic approaches. Non-genetic approach constitutes agronomic biofortification, while genetic approaches constitute biofortification through conventional breeding and genetic engineering.

Agronomic Approaches

Agronomic approach includes physical application of nutrients to the soil, their solubilization and mobilization to various parts of the plants, foliar feeding or seed treatment to enrich the edible part of field crops with micronutrients. Apart from NPK, microminerals iron, zinc, copper, manganese, I, Se, Mo, Co, and Ni are usually absorbed from the soil and occurs in the edible portion of certain plants. Agronomic biofortification is simple and inexpensive, but needs special attention in terms of source of nutrient, application method and effects on the environment. These should be applied regularly in every crop season and thus are less cost-effective in some cases. Soil microorganisms like different species of genera *Bacillus*, *Pseudomonas*, *Rhizobium*, *Azotobacter*, etc. can also be utilized to increase the phytoavailability of mineral elements. The N_2-fixing bacteria play an important role in increasing crop productivity in nitrogen limited conditions. Many crops are associated with mycorrhizal fungi that can release organic acids, siderophores, and enzymes capable of degrading organic compounds and increasing mineral concentrations in edible produce.

Conventional Breeding Approach

Traditional plant breeding includes identifying and developing parent lines with a naturally high concentration of the target nutrient and crossing them over time to produce the desired concentrations of the nutrient and agronomic traits in the plants. Biofortification through conventional breeding in the most accepted method of biofortification. It offers a sustainable, cost-effective alternative to transgenic and agronomic-based strategies. Sufficient

genotypic variation in the trait of interest is necessary for conventional breeding to be feasible. Breeding programs can utilize this variation to improve the levels of minerals and vitamins in crops. However, breeding strategies have to sometimes rely on the limited genetic variation present in the gene pool. In some cases, this can be overcome by crossing to distant relatives and thus moving the trait slowly into the commercial cultivars. Alternatively, new traits can be introduced directly into commercial varieties by mutagenesis. For biofortification using the conventional plant breeding approach to be considered as a feasible and effective approach to alleviating hidden hunger, three conditions should be met. These are (1) conventional breeding can add extra nutrients in the crops without reducing yields; (2) when consumed, the increase in nutrient levels can make a measurable and significant impact on human nutrition; and (3) farmers are willing to grow biofortified crops and consumers to eat them.

Biotechnological Approach

Transgenic approach for biofortification is necessary due to several weaknesses of conventional approaches which involve absence of elite genotype for the desired trait within the species (e.g., provitamin A in rice), long time period required to introduce single or multiple traits (pyramiding traits) and inability to target nutritional traits to specific organs. The existence of an inverse relationship between grain mineral concentration and grain yield also limits the application of conventional breeding.

The transgenic approach involves the syntheses of transgenes that causes the micronutrient re-translocation between tissues and enhance their bioavailability, increasing the efficacy and reconstruction of biochemical pathways. It can also be used for reduction in the concentration of antinutrients which limit the bioavailability of nutrients in plants. Among micronutrients, vitamins, minerals, essential amino acids, and essential fatty acids have been targeted by the use of various genes from different sources to enhance the food crop nutritional level. Development of transgenically biofortified crops initially involves substantial amount of time, efforts, and investment during research and development stage, but in a long run, it is a cost-effective and sustainable approach, unlike nutrition-based organizational and agronomic biofortification programs (Hefferon, 2016 and White and Broadley, 2005).

Table 1: Crops biofortified using various approaches

	Crop	Biofortified for	Reference
1	Rice	Beta-carotene	Ye et al. (2000)
		Folate (vitamin B9)	Storozhenko et al. (2007)
		Iron	Takahashi et al. (2001); He et al. (2013)
		Zinc	Wei et al. (2012) CIAT, HarvestPlus
2	Wheat	Zinc	CIAT, CIMMYT, HarvestPlus
		Provitamin A Carotenoids	Wang et al. (2014)
		Iron	Sui et al. (2012); Aciksoz et al. (2011)
		Zinc and iron	Indian Institute of Wheat and Barley Research, India
		Carotene	IARI
		Anthocyanins (colored wheat)	Garg et al. (2016)
3	Maize	Lysine and Tryptophan	SurinderVasal and Evangelina Villegas, CIMMYT
		Provitamin A Carotenoids	Aluru et al. (2008)
		Lysine	Monsanto
		Zinc	Alvarez and Rico (2003)
4	Barley	Zinc	Ramesh et al. (2004)
5	Sorghum	Provitamin A	Lipkie et al. (2013)
		Mycorrhiza + Bacteria	Dhawi et al. (2015)
		Iron	ICRISAT, HarvestPlus
6	Potato	Reduced amylose and increased amylopectin in starch granules	BASF
		Zinc	White et al. (2001)
		Antioxidants	Lachman, et al. (2005)
7	Cassava	Beta-carotene	Biocassava Plus
8	Linseed/flax	Essential amino acids	University of Saskatchewan, Canada
9	Canola	Phytate degradation (increase in available P)	BASF
10	Millets	Iron and zinc(Pearl Millet)	ICRISAT, HarvestPlus
11	Cowpea	Iron	G.B. Pant Agriculture University, HarvestPlus
12	Cauliflower	Beta-carotene	IARI, India
13	Banana	Vitamin A	Bioversity International—Uganda, HarvestPlus
14	Mango	Beta-carotene	IARI, India

Table 2: Significant improvement achieved in nutritional quality over the baseline values and national level released bio fortified variety in different field and horticultural crops (Source: Yadav at al. 2020)

S. No.	Crop	Nutrient	Baseline levels	Levels achieved	national level released bio fortified variety
1	Rice	Protein	7.0-8.0 %	>10.0 %	CR Dhan 310, DRR Dhan 45, DRR Dhan 48, DRR Dhan 49, Zinco Rice MS, CR Dhan 311 (Mukul), CR Dhan 315
		Zinc	12.0-16.0 ppm	>20.0 ppm	
		Protein	8-10 %	>12.0 %	
2	Wheat	Iron	28.0-32.0 ppm	>38.0 ppm	**Bred Wheat**-WB 02, HPBW 01, durum, PusaUjala (HI 1605), HD 3171, PBW 752, PBW 757, Karan Vandana (DBW 187), DBW 173, UAS 375, DDW 47, PBW 771, HD 3298, HI 1633, DBW 303, **Durum**- (DDW 48, PusaTejas (HI 8759), HI 8777, MACS 4028, 4058 & HI 8802, 8805),
		Zinc	30.0-32.0 ppm	>37.0 ppm	
3	Maize	Provitamin-A	0.5-1.5 ppm	>5.0 ppm	**Hybrid**-Vivek QPM 9, Pusa HM4, Pusa HM8, Pusa HM9, PusaVivek QPM9,Pusa VH 27, Pusa HQPM 5, Pusa HQPM 7, IQMH 201, IQMH 202, IQMH 203
		Lysine	1.5-2.0 %	>2.5 %	
		Tryptophan	0.3-0.4 %	>0.6 %	
4	Pearl Millet	Iron	45.0-50.0 ppm	>70.0 ppm	**Hybrid**-HHB 299, AHB 1200Fe, AHB 1269Fe, ABV 04, PhuleMahashakti, RHB 233, : RHB 234, HHB 311
		Zinc	30.0-35.0 ppm	>40.0 ppm	
5	Finger Millet	Iron	25.0 ppm	>38.0 ppm	VR 929 (Vegavathi), CFMV1 (Indravati), CFMV 2
		Zinc	16.0 ppm	>24.0 ppm	
		Calcium	200.0 mg/100g	>400.0 mg/100g	
6	Lentil	Iron	45.0-50.0 ppm	>62.0 ppm	PusaAgetiMasoor, IPL 220
		Zinc	35.0-40.0 ppm	>50.0 ppm	
7	Groundnut	Oleic acid	45.0-52.0	% >70.0 %	Girnar 4, Girnar 5
8	Cauliflower	Provitamin-A	Negligible	>8.0 ppm	Pusa Beta Kesari 1
9	Potato	Anthocyanin	Negligible	>0.60 ppm	KufriManik, KufriNeelkanth
10	Sweet	Provitamin-A	2.0-3.0	>13.0	BhuSona, Bhu Krishna

	Potato		mg/100 g	mg/100 g	
		Anthocyanin	Negligible	>80.0 mg/100g	
11	Greater Yam	Anthocyanin	Negligibl	35-60 mg/100g	SreeNeelima, Da 340,
		Iron	70-120 ppm	>135.0 ppm	
		Zinc	22-32 ppm	>48.0 ppm	
		Calcium	800-1200	ppm >1800 ppm	
12	Pomegranate	Iron	2.7-3.2 mg/100g	>5.0 mg/100g	Solapur Lal
		Zinc	0.50-0.54 mg/100g	>0.6 mg/100g	
		Vitamin-C	14.2-14.6 mg/100g	>19.0 mg/100g	
13	Mustard	Erucic acid	>40.0 %	<2.0 %	Pusa Mustard 30, 31 &Pusa Double Zero Mustard 31
		Glucosinolates	>120.0 ppm	<30.0%	
14	Soybean	Kunitz trypsin inhibitor	30-45 mg/g of seed meal	Negligible	NRC 127, 132,147

Conclusions and Future Thrust

It is well established that biofortification is a promising, cost-effective, agricultural strategy for improving the nutritional status of malnourished populations throughout the world. Biofortification strategies based on crop breeding, targeted genetic manipulation, and/or the application of mineral fertilizers hold great potential for addressing mineral malnutrition in humans. The next gene revolution should focus on sustainable solutions for malnutrition, as part of a humanitarian intervention, concerted with educational efforts as a cornerstone to halt population growth, improve living standards, and bring about global peace.

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AGRIALLIS
Science for Agriculture and Allied Sector: A Monthly Magazine

Article Id
AL04144

EULOPHID SEED BORER, *Anselmella kerrichi*: A NOVEL INSECT PEST OF JAMUN

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Jamun, *Syzygium cumini* L. (Myrtaceae) commonly known as jambul, black plum, Indian blackberry etc. is an evergreen perennial fruit tree of tropical and subtropical regions. It is found throughout Southeast Asia and the Pacific regions being native to the Indian Subcontinent and adjoining regions of Southeast Asia. The tree bears dark-purple fruit annually, timber, and is of ornamental value. The fruits are of high demand for their economic importance with several medicinal properties.

According to the existing literature, Jamun is attacked by number of insect pests (~78 species) in India. However, seed borer, *Anselmella kerrichi* (Hymenoptera: Chalcidoidea: Eulophidae) was nowhere reported as an insect pest of jamun. The database of insect pests maintained by the National Bureau of Agricultural Insect Resources (ICAR-NBAIR), Bengaluru, mentions the larval stages of *A. kerrichi* feeding mainly on the seeds of jamun as phytophagous(Narayanan *et al.*, 1958). One interesting thing is that *A. kerrichi* is phytophagous in nature unlike other eulophids which are mainly parasitoids of other insects. The other species of the jamun viz. *Syzygium austral* (brush cherry), *Syzygium smithii* (lilly pilly), *Syzygium pachyphyllum* (thick leafed jambu) and *Syzygium samarangense* (java apple) reported many species of seed borer *Anselmella*, viz. *Anselmella miltoni*, *Anselmella malacia* and *Anselmella occult* from Queensland, Malaysia and Papua New Guinea, respectively, as serious pests of *Syzygium*. In India, first report of *A. kerrichi* was from Pune, Maharashtra, in 1957. Except this, there are no reports that state the economic importance and nature of damage of this eulophid seed borer in jamun (Jun *et al.*, 2005). This may be due to its limited distribution and pestilence.

FIG. 1: a. Pricks on immature Jamun fruits, b. adult *A. kerrichi*; c & d. galleries (source: Mala *et al*., 2019).

However, recently, several incidences of *A. kerrichi* infesting *S. cumini* fruits causing huge economic losses in jamun cultivation have been noticed in fields of rural Bengaluru. The adult female wasp starts the damage process by laying eggs inside the tender fruits. Fully-grown adults after completing the life cycle emerge out from the seed by making a circular hole, in turn causing both quantitative and qualitative losses. The infested fruits exhibit black, pin size oviposition punctures along with circular exit holes on the rind. Heavy infestation of *A. kerrichi* on jamun fruits renders the fruits unmarketable.

Conclusion

Jamun seed borer thus can become a great problem to the growers considering the huge damage it can cause and the ability to build up in vast numbers (~85 per fruit), given that both fruit, as well as seed, are economically important in jamun. In addition, larval feeding can lower seed viability and rate of germination. To minimize the economic losses

caused by *A. kerrichi*, the application of colour traps, safe botanical pesticides may help reduce seed borer infestation considering the need for eco-friendly integrated pest management tactics.

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AGRIALLIS
Science for Agriculture and Allied Sector: A Monthly Magazine

Article Id
AL04145

A1 AND A2 MILK: THE NEW TREND IN DAIRY INDUSTRY

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India is an agriculture-based country, majority of its population depends on agriculture as their sole source of income. Livestock population of India plays an important contribution to the agricultural sector. Out of the major products contributed by the livestock, milk leads the list. India ranks one in terms of total livestock population as well as total milk production in the world. India contributes about 22 percent of the total global milk production. Milk is known for its fat and SNF content. Milk is known to be an important source of protein. The protein content in milk varies in different species. In the recent need to increase the nutritive value of the milk, the composition of milk has been taken into account. The milk protein is the current topic of discussion in the advent of A1 and A2 milk.

Casein constitutes the major protein proportion in milk, acting as sources of peptides with bioactivity. Out of these peptides, Beta-casomorphins (BCMs) are defined as a group of peptides with opioid properties that are formed from proteolytic digestion of β-casein. Out of all beta casomorphins, beta-casomorphin 7 (BCM7) is the most important. Beta Casein has 209 amino acids. There are 13 variants present in bovine milk, including A1, A2, A3, A4, B, C, D, E, F, H1, H2, I, and H, of which A1 & A2 are the common. A1& A2 milk differ in their 67 th position having histidine & Proline, respectively. The A2 is mostly associated with the desi cows while A1 is associated with crossbred cows. The histidine is loosely bound with BCM 7 as compared to Proline so, A1 milk acts as a source of beta casomorphin. Various physiological effects of these peptides have also been documented, i.e., secretion of mucus, increased activity of superoxide dismutase and catalase, increased levels of prolactin, and analgesic role. Beta casomorphins are also associated with various immunological functions, such as development of innate immunity, lymphocyte proliferation and cellular immunity, role in autoimmune diseases, histamine release, and allergy. These modulate gut secretions and motility, blood pressure and have antithrombotic, antioxidant, antimicrobial, and

immunomodulatory activities. With research, it has been found that Beta casomorphins is linked to cardiovascular diseases & diabetes type 1. Due to the consumption of milk with higher BCM7 it was found that there is sudden infant death syndrome & various neurological disorders. So, in higher concentration it is considered as the devil in the milk.

Functional Importance of BCM 7:

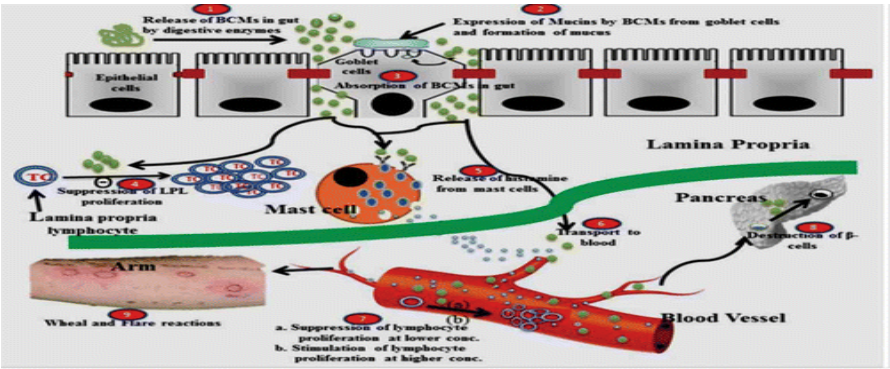
BCM-7 has a protective role against hyperglycemia and free radical-mediated oxidative stress : It has been found that oral administration of BCM-7 to the diabetic group of rats increased plasma insulin level, decreased glucagon level, and elevated the activity of superoxide dismutase and catalase.BCM7 exerts a positive inotropic and antiarrhythmic effect and thus had a cardioprotective function.In recent studies it has been noted ,BCM-7 contributed to the redox state and epigenetic modifications that appear to influence neural development.

Immunological Perspective of Beta Casomorphin: BCMs are known to show many immunological activities like chronic inflammatory responses, such as allergy, mucin production, lymphocyte proliferation etc.

Mucus Secretion and Innate Immunity: BCM-7 contributes significantly to mucin production via a direct effect on intestinal goblet cells and the activation of μ-opioid receptors. BCM-7 improves intestinal protection, supports innate immunity, and thus also has dietary and health applications.

Lymphocyte Proliferation & Cellular Immunity: High concentration of beta casomorphins result in stimulation of lymphocyte proliferation. High affinity of BCMs for μ-opiate receptors exploit their endorphin-like activity on the development of T lymphocyte function and cellular immunity.

Heath Complications Related to A1 Milk: Various epidemiological studies have shown, significant association between the intake of A1 milk and the incidence of **diabetes type-1**. BCM7 may act as an adjuvant in the autoimmune reaction involved in destruction of β-cells. The intake of BCM-7 with **cardiovascular disease** mortality. This cause hypercholesterolemia or atherosclerosis.



High BCM-7 levels in the blood remained results in a higher risk of **delayed psychomotor development.** High level of beta casomorphin results in Sudden Infant Death Syndrome (SIDS). The higher levels result in apnea.

Milk allergy: BCMS result in selective release of histamine from the mast cells. They result in a wheal & fare reaction.

Milk intolerances: BCM-7 slows down the passage of food through the digestive system (like other opioids) providing a longer time for lactose fermentation.

Conclusion

Efficacy of beta casomorphins to promote health and well-being is a matter of debate. Even if these are potential modulators of various regulatory processes in the body, these have been associated with various physiological disorders. Since in A1 milk the histidine is loosely bound to the beta casomorphins, the digestive enzymes result in the release of BCMs, & thus result in physiological disorders like diabetes, cardiovascular diseases etc. While in A2 milk , the Proline is strongly attached to beta casomorphins & hence result in very least complications. Thus, there is a growing global interest for A2 milk as an alternative milk product.

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AGRIALLIS
Science for Agriculture and Allied Sector: A Monthly Magazine

Article Id
AL04146

SURROUNDING METHOD: A STRATEGY DEVELOPMENT PROCESS FOR AGRIBUSINESS

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Strategic planning in agribusiness is key activity for the healthy performance of your business in long run. Agribusiness is operated in a complex agri-entrepreneurial ecosystem that is uncertain. To thrive under such uncertain complex system you need to be aware of the business growth trajectory. The success of your business needs significant understanding of the complex agri-entrepreneurial ecosystem and a robust strategic plan to grow through such complex system. Irrespective of the scale of your agribusiness you need to grow and, the opportunity and threats to growth lies in the market. To tap the available opportunity and face the uncertain threats you need a strong strategic response. In this article we will take you through the process of strategy development through surrounding method approach.

What is a strategy?

Strategy is a special type of a business plan generally a long term plan that clearly states your plans, actions and goals that sketches how your business with its product(s) will compete in a given complex business environment.

What is Strategy Development process?

Strategy Development is the process of investigating and finding out the most suitable strategic response or action with an aim to achieve the objectives, mission and vision of an organization. Both SWOT Analysis and the TOWS Analysis can be used for the development of a strategic action. SWOT analysis provides the insights on the current situation of a given business in a context. Whereas, TOWS is a logical extension of SWOT that enable one to develop a strategic response from the output of SWOT analysis.

Strategy Development is important in order to analyze the Internal and External factors for the Growth and Productivity of any business. There should be some aspects which you should keep in mind before you perform this Strategy Development process:

- What shall be your Vision and Mission of the business?
- How would you achieve you goals for the betterment of the business?
- What will your action plans for overall business Growth?
- Problem solving tactics to be followed.
- Available options according to your Internal and External Factors.

What is Surrounding Method of Strategy Development?

In this section we will discuss about the surrounding method, this is a basic framework practised for the strategy development process (Figure1) but it may vary under different circumstances.

A. Establishing a context and purpose

The first thing to keep in mind while developing a strategic response is establishing Context. It is important to know in which context and for what purpose the strategy is being developed. For example, English language proficiency of a Sales Executive posted in particular region maybe strength but it may turn into a weakness in another region where this language is not understood by his clients. Therefore, context will help us to place the factors in a correct manner. Regardless of the activity taken forward, the purpose of the analysis should be known as it helps in identifying the valuable inputs.

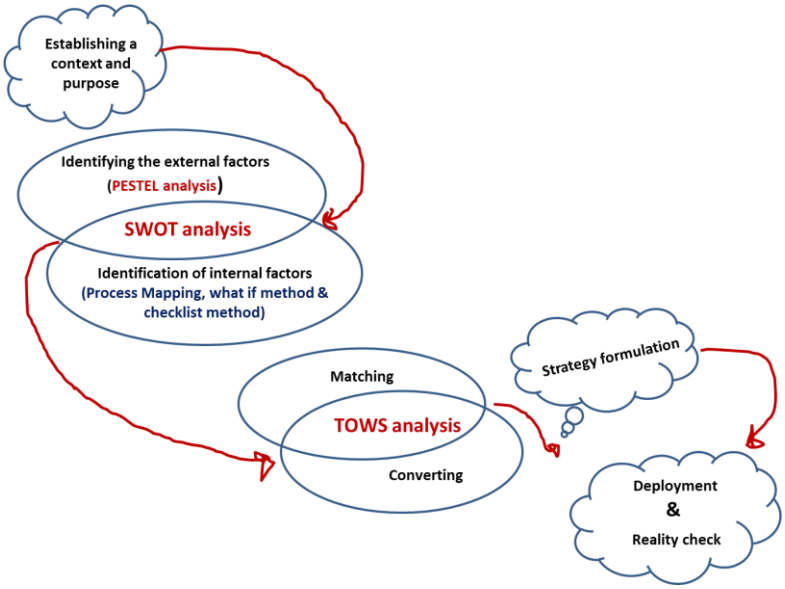

Fig. 1: Surrounding method of strategy development process
Source: Clipart edited by the authors

B. Identifying the external factors

The second step is to identify the external factors i.e., Opportunities and Threats. For discovering these factors, the environment is scanned thoroughly. Environmental scanning has various sources such as market feedback, operation review, consumer feedback, etc. As external factors are dynamic and are uncontrolled, these factors are identified before the internal factors. Another reason why we detect these factors first is to avoid underestimation and overestimation of our threats and strengths respectively. PESTEL Analysis (Figure 2) can be done to analyze and monitor the macro-environmental situation. PESTEL stands for Political, Economic, Social, Technological, Legal and Environmental factors.

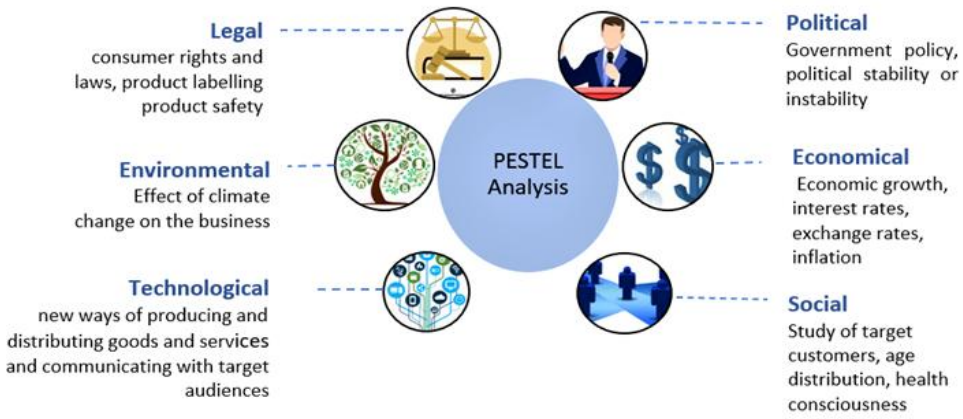

Fig. 2 : Component of PESTEL Analysis
Source: Clipart edited by the authors

C. Identification of internal factors

The Internal factors include Strength and Weakness. These factors are under our control and can be identified using these three approaches.

- **Process Mapping:** In this approach, the whole process involved in aagribusiness is mapped. The aim is to spot where the issue is supported or hampered with the presence or absence or performance of internal capabilities.

- **What If Method:** This method starts with an idea or a new proposition. It stimulates imagination and innovativeness. For example, what if we want to launch a new food product? What if we start a agro-tourism?

- **Checklist Method:** As the name suggests, checklist method means creating a checklist of a list of items or points to be considered while identifying strengths and

weaknesses. Checklists have the objective of overseeing tasks or projects and ensuring nothing important is forgotten during execution.

D. Matching in TOWS matrix

SWOT gives us the situational analysis. In order to develop strategy using SWOT, we have to be thorough with the --SWOT elements and the SWOT is flipped to TOWS (Figure 3). TOWS matrix is a logical extension of SWOT matrix which is strategy development tool. Matching and converting are the two activities done to develop strategic response. In matching process we link the external factors with the internal factors as delineated in fig. 4.

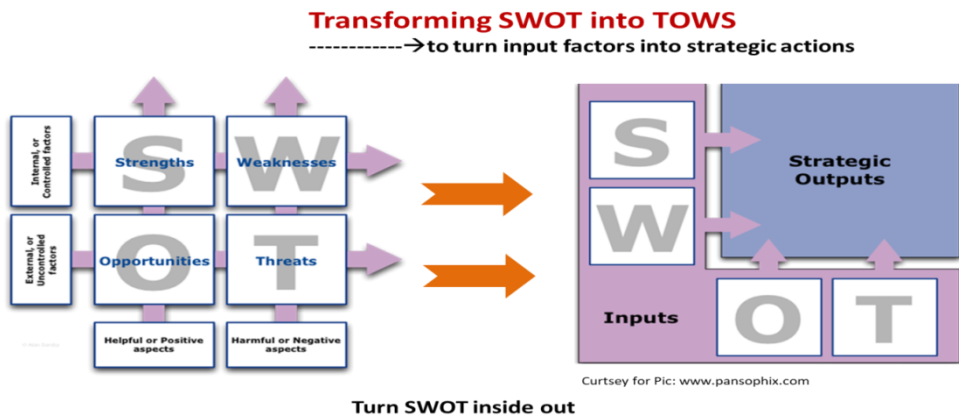

Fig. 3: SWOT and TOWS matrix
Source: adopted from Alan Sarsby (2012).

Fig. 4: Matching in TOWS matrix

Fig. 5: Converting in TOWS matrix
Source: Clipart edited by the authors

E. Conversion in TOWS matrix

We convert the uncontrolled or harmful factors into controlled or helpful factors i.e., Internal factors into Opportunity.For example: - suppose a company wants to convert its weakness into an opportunity (Figure 5), its weakness being less no of employees and opportunity being expansion of business. Here, the business can use its existing strength which may be a huge amount of fund available. The funds can be utilized in recruiting new employees. In short, the weakness of a business can be converted into an opportunity using an existing strength.

F. Formulation of strategy using TOWS matrix

After analysis of both factors, decisions are taken while focusing on context. Different generic strategies are developed based on the TOWS matrix analysis. The four generic strategies that can be developed by matching and converting of SWOT factors is presented in figure 6.

Fig. 6: Generic strategies

Source: Clipart edited by the authors

- **Growth Strategy**

Curtsey: pngitem.com

Growth strategy is the outcome of matching strength of an organization with opportunities to increase our capabilities. Here the business makes use of its strength to tap the opportunity in the market. Most important aspect is to grow the business does more of those activities in which it is good at doing.

- **Internal Development strategy**


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Convert weakness into strength followed with matching strength to its opportunities and helps us to create new capabilities. Here a business identifies its weakness and tries to convert them into strengths and then tap the opportunities. For instance, poor skilled employees may be its weakness, following Internal Development strategy; capacity building activities are planned.

- **External Development strategy**


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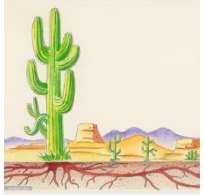
Use strengths of organization to convert its threats into opportunities. When your business is facing some threat say may be a competitor, under such situation following external development strategy the business make use of its strengths to convert the threat into an opportunity. For example the company may lobby to restrict the entry of the new firm and using its capitals strength may increase the scale of production to provide the produce at cheaper rates.

- **Survival strategy**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This strategy is adopted by any business to stay afloat in the market. Here, threats and weaknesses are combined. Both conversion and matching approaches are applied here. When a business is under the attack of sever external threat and plaguing internal weakness the firm has to adopt survival strategy to be alive in the market until the situation is changed. To address such situation multiple strategies are adopted.

G. Deployment

The process of bringing intent into effective action. It serves as a basis for performance standards, planning, decision-making and resource allocation. The process of implementing the organizational vision and strategy in a systematic and structured way.

Things to keep in mind while putting together a strategy development process: -

- **Communication:** It implies the way your strategy will be conveyed. Honest Communication with the employees in the strategy deployment encourages an open

exchange of ideas and information so that the receiver receives the message in exactly the same manner it is conveyed.

- **Implementation:** Act of executing a strategy to reach its desired set of goals. Provide with some thoughts about how and what kind of programme it would be.
- **Measuring success:** Create some indicators which help you to check the success and know about the real reviews of programme.

H. Reality check

Testing the decision is the final step of strategic development process. In reality, giving the correct and unbiased decision is very difficult as it involves higher level of subjectivity. It includes

- Whether the strategy adopted is valid and should be practiced or not? Is it effective? Does it lead to the improvement in work efficiency i.e. whether this plan provides quality output? Is the strategic plan reliable and sustainable?

Conclusion

Developing a strategy is important when an individual or a business organization wants to achieve its goals and objectives. Strategy development is a team work and requires clarity of context in which your business operates and the purpose of strategy development. Further, in-depth analysis of internal strength, weakness and external opportunities and threats is a key for effective strategy development. It will help one to be in line with their mission and vision in the long run. All the steps right from establishing context and purpose till the last step which involves reality check should be given equal weightage. Care must be taken while formulating strategies because a single mistake may cause a complete debacle. All things considered, Strategy development lets you to understand the potential of the business that is crucial to the planning process and for a competitive edge.

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