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Noor Syazwani Omar, Sharifah Noor Emilia, Muhd Danish-Daniel, Shumpei lehata, and Natrah Fatin Mohd Ikhsan (Faculty of Fisheries and Food Science, Universiti Malaysia Terengganu)

Probiotics bacteria as quorum sensing degrader control *Aeromonas hydrophila* pathogenicity in cultured red hybrid tilapia

Indonesian Aquaculture Journal, 18(1), 2023, 1-15

Quorum sensing (QS) is the interaction of bacteria cell-to-cell to regulate various bacterial functions, including bacterial virulence. It has been suggested that QS interruption is an anti-infective strategy to combat diseases in aquaculture. This research was conducted to isolate the potential probiotics bacteria as QS degrader from the fish gut and investigate its efficiency in reducing *Aeromonas hydrophila* pathogenicity by in vitro and in vivo assay. In this study, three isolates from the fish gut were able to degrade N-acyl homoserine lactone (AHL), one of the QS signals of *A. hydrophila*. Based on 16S rDNA sequence analysis, isolate CPI12 was identified as *Klebsiella sp.*, CBa5 and CBa7 were identified as *Enterobacter tabaci*. These isolates were co-cultured with *A. hydrophila* for five days. Results revealed that all isolates could decrease the AHL production of *A. hydrophila* but did not affect the growth of the pathogen. In vivo assay results showed that isolate CPI12 reduced the pathogenicity of *A. hydrophila* against tilapia with a significantly higher survival rate ($p < 0.05$) of fish in the CPI12-fed group than the control group. Meanwhile, isolate CBa7 was significant ($p < 0.05$) for growth performance, including specific growth rate (SGR), weight gain (WG), feed conversion ratio (FCR), mean weight gain (MWG), and average daily growth (ADG) among whole treatment and control group. These results displayed that the probiotics bacteria as QS degrader isolated from the fish gut could control the pathogenicity of *Aeromonas hydrophila*. It has been proposed that QS degrader bacteria might be an alternative solution for disease control.

KEYWORDS: Growth performance; N-acyl homoserine lactone; pathogen; quorum sensing

Eddy Supriyono, Kuku Nirmala, Kadir Sabilu, Wa Iba, and Murni Sabilu (Department of Aquaculture, Faculty of Fisheries and Marine Sciences, IPB University)

Capability of sea cucumber *Holothuria scabra* to remove nitrogen and phosphor waste from shrimp ponds culture

Indonesian Aquaculture Journal, 18(1), 2023, 17-25

Solid organic waste (PSW) in shrimp ponds contains relatively high levels of nitrogen and phosphorus and can endanger the ecological balance of the waters. This study evaluates the ability of sea cucumber *Holothuria scabra* to remove nitrogen and phosphorus loads from shrimp pond sediment waste in water and sediment. Sea cucumbers were reared for 40 days with a density of 20 individuals/m² (average body weight 2.65 ± 0.09 g) and a double-bottom recirculation system. Five levels of PSW accumulation were inserted into the aquarium substrate and were the sole source of nutrition for sea cucumbers without additional feeding: 10%, 20%, 30%, 40%, and 50% (with three replications). The results showed that increasing the PSW content in the aquarium research substrate significantly increased the substrate's TOC, TN, and TP content and increased the concentrations of TOM, DOC, NH₃, NO₂, and PO₄ in the water column. The activity of sea cucumbers in utilizing PSW nutrients in all treatments up to a PSW level of 50% significantly reduced TOC, TN, and TP in sediments. This activity also substantially removes the concentration of TOM, DOC, NH₃, NO₂, and PO₄ in the water. It is estimated that every kilogram of *H. scabra* can remove up to 12.65-12.73 g of nitrogen/day and 2.57-2.60 g of phosphorus/day contained in the solid organic waste of shrimp ponds. Therefore, this study concluded that *H. scabra* has great potential to be used as integrated multi-trophic aquaculture (IMTA) species, especially to remove nitrogen and phosphorus loads from shrimp pond sediment waste in waters.

KEYWORDS: *Holothuria scabra*; nutrients removal; phosphorus; solid organic waste

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Benny Heltonika, Agus Oman Sudrajat, Muhammad Zairin Junior, Widanarni Widanarni, Muhammad Agus Suprayudi, Wasmen Manalu, and Yani Hadiroseyani (Department of Aquaculture, Faculty of Fisheries and Marine Sciences, IPB University)

Cannibalism performance of asian redbtail catfish (*Hemibagrus nemurus*) fed ration supplemented with different doses of 17 α -Methyltestosterone

Indonesian Aquaculture Journal, 18(1), 2023, 27-35

One of the obstacles in Asian redbtail catfish hatchery is the high cannibalism incidence. Cannibalism is associated with aggressive behavior caused by hormonal metabolism especially of testosterone. The purpose of this study was to evaluate the effect of testosterone administration on the cannibalism incidence in the Asian redbtail catfish juveniles. The experiment was conducted by rearing fish with initial length of 4.09 ± 0.19 cm in 16 of 20 L aquariums with a density of 2 fish L^{-1} . The experiment was designed with a completely randomized design with 4 treatments which were different level of 17 α -methyltestosterone supplementation in feed, i.e., 0 mg kg^{-1} feed (A) as control, 7.5 mg kg^{-1} feed (B), 15 mg kg^{-1} feed (C), and 30 mg kg^{-1} feed (D). Each treatment has 4 replications. Fish fed experimental diet (40% protein) 4 times a day to satiation for 30 days. The parameters observed were type and index of cannibalism, aggressive behavior, survival rate, normal mortality, growth performance, hormones concentrations (estradiol, testosterone, and cortisol), and water quality. The results showed that cannibalism type II (the fish eaten completely or missing) and cannibalism index increased with the increasing doses of testosterone administration in the feed with the highest cannibalism incidence was 40.63%. The highest survival rate was found in treatment B ($73.75 \pm 2.50\%$) and was not significantly different from the control treatment ($69.38 \pm 2.39\%$). No differences in testosterone concentration and in the growth performance among the treatments. However, there was a trend of decrease in the estradiol concentration of Asian redbtail catfish juveniles fed ration supplemented with the increasing doses of 17 α -methyltestosterone. Based on the results obtained in this research, estradiol changed in the body's plasma, it appears that there was a role for plasma estradiol concentration in controlling cannibalism of Asian redbtail catfish juveniles. It concluded that the testosterone administration affected the cannibalism incidence in the Asian redbtail Catfish.

KEYWORDS: cannibalism; testosterone; estradiol; *Hemibagrus nemurus*

Nikolai Nikolayevich, Svetlana Evgenyevna Leskova, and Evgeny Valerevich Mikheev (Far Eastern State Technical Fisheries University)

Comparative assessment of the effect of gibberellic and salicylic acids on the growth and biochemical parameters of *Phaeodactylum tricornutum*

Indonesian Aquaculture Journal, 18(1), 2023, 37-44

The research of the effect of gibberellic ($0.4 - 3.8 \times 10^{-8}$ mol. L^{-1}) and salicylic ($0.4 - 3.8 \times 10^{-5}$ mol. L^{-1}) acids, in a wide range of their concentrations, on the growth indicators and biochemical composition of the cumulative culture of the microalgae *Phaeodactylum tricornutum* was carried out. It was determined that salicylic acid in a concentration of 0.4×10^{-5} mol stimulated cell growth by 184.6%, and gibberellic acid at a concentration of 0.39×10^{-8} mol by 181%, compared to the control. The effect of gibberellic acid during the experiment was expressed in the inhibition of protein accumulation in the culture, compared with the control. The use of salicylic acid led to a greater accumulation of protein in the culture than when using gibberellic acid. It was shown that salicylic acid had a positive effect on the accumulation of carbohydrates on day 9 and gibberellic acid on day 14 of culture. Gibberellic acid had no effect on the accumulation of lipids in the culture of microalgae. Under the action of salicylic acid for 14 days of cultivation, the lipid content increased by 18.5%, compared with the control. There were no quantitative differences in the content of chlorophyll when using two phytohormones. In this study, the optimal concentrations of gibberellic and salicylic acids for linear growth rate and the highest production of protein and carbohydrates for *Phaeodactylum tricornutum* were determined. Position, depending on the stage of microalgae growth, is noted.

KEYWORDS: cultivation; gibberellic acid; *Phaeodactylum tricornutum*; salicylic acid

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Tatan Sukwika, and Nugroho B Sukamdani (Environmental Engineering, Sahid University)

Multi-dimensional sustainability assessment in micro-business of siamese fighting fish cultivation during the covid-19 pandemic

Indonesian Aquaculture Journal, 18(1), 2023, 45-52

The economic value of Siamese Fighting fish and betta fish (*Betta splendens*) cultivation at the micro-business level has good potential to be developed during the COVID-19 pandemic. Considering the potential of the betta ornamental fish business, not a few parties use this as an alternative solution to the community's income crisis. During the COVID-19 pandemic, many parties engaged as ornamental fish cultivators to become a commodity of economic value, which in the past was usually only fish for complaints and not specifically cultivated to become aesthetic fish. The research objective focuses on assessing multi-dimensional sustainability in micro-business *Betta splendens* aquaculture during the pandemic. The data collected in this study include primary data and secondary data. Primary data was collected based on a questionnaire through interviews with micro-business actors of betta fish spread across six villages community associations, while secondary data was collected based on reports, journals, and the results of relevant studies. Data analysis used multi-dimensional scaling (MDS), leverage test, and Monte Carlo test. The analysis results show that two dimensions are categorized as less sustainable, namely business feasibility and business strategy, and three other dimensions, namely market networks, infrastructure, and maintenance and handling categorized as moderately sustainable. Ten sensitive attributes are considered unstable. The conclusion of the five dimensions assessed shows a less sustainable category. Leveraging factors in each dimension can be a key to developing a sustainable strategy for micro-business siamese fighting fish farming in the future.

KEYWORDS: Multi-dimensional scalling; Betta fish; Sustainability; Micro-business

Aliati Iswantari, Kurniawan Kurniawan, Vitas Atmadi Prakoso, Deni Radona, Deni Irawan, Fera Permata Putri, Wahyulia Cahyanti, Otong Zenal Arifin, Jojo Subagja, Rudhy Gustiano, Irin Iriana Kusmini, Arif Wibowo, and Anang Hari Kristanto (Department of Aquatic Resources Management, IPB University)

Resilience and physiological responses of the domesticated asian redbtail catfish *Hemibagrus nemurus* to hypoxia condition

Indonesian Aquaculture Journal, 18(1), 2023, 53-60

Hypoxia is one of the critical issues in aquaculture production systems as it can lead to physiological disturbances in cultured fish. This research aimed to evaluate the tolerance level and physiological responses of domesticated Asian redbtail catfish *Hemibagrus nemurus* reared in various hypoxia conditions. A total of 12 fish/treatment were acclimated to gradually decreased dissolved oxygen treatments until fish experienced aquatic surface respiratory (ASR) and loss of equilibrium (LOE). Cortisol, haemoglobin, and glucose levels were detected in the blood plasma to evaluate the stress response of the fish to hypoxia. The result showed that ASR of *H. nemurus* was identified at 2.17 ± 0.14 ppm of dissolved oxygen (DO) concentration with the percentage of ASR was $77.67 \pm 9.53\%$, while LOE critical of *H. nemurus* happened at 0.63 ± 0.15 ppm of DO where $55.56 \pm 4.81\%$ of the fish experienced LOE. There were significant differences in the values of physiological parameters (blood cortisol, haemoglobin, and glucose) between control and treatments as fish experienced LOE ($P < 0.05$). In the present study, it was found that the Asian redbtail catfish is classified as a hypoxia-sensitive fish group. This finding is valuable information for the rearing and growing of the fish to provide an optimal DO concentration for their growth and survival.

KEYWORDS: ASR; LOE; stress; cortisol; haemoglobin; glucose

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Rizky Regina Kawirian, Ridwan Affandi, Ali Mashar, and Irzal Effendi (Study Program of Aquatic Resources Management, Graduate School of IPB University)

Food preferences of early juvenile scalloped spiny lobster in Ekas Bay, Lombok, Indonesia

Indonesian Aquaculture Journal, 18(1), 2023, 61-69

Ekas Bay is the largest bay on the island of Lombok which is the location for catching and cultivating spiny lobsters. This research was conducted from May to July 2021 on the Scalloped spiny lobster (*Panulirus homarus*). This study aims to identify the types of natural foods consumed and determine the preferred types of food, as well as the early juvenile feeding time of Scalloped spiny lobster located in Ekas Bay, East Lombok Regency, West Nusa Tenggara Province (NTB). Puerulus samples were collected in the last week of May 2021, enlarged puerulus was performed in submerged cages measuring 15 cm × 15 cm × 15 cm, mesh size < 3 mm, with a density of 4 puerulus/m². The cages are placed at a location 70 m to the sea from the shoreline, at a depth of 0.5, 1.0, and 1.5 m. After reaching the juvenile phase, lobsters are collected during the new and full moon phases (06.00 am, 06.00 pm and 12.00 am, respectively) in June to July 2021. A total of 60 individual juvenile lobsters (algal phase) were analyzed for their stomach contents. The average percentage of the total Index of Relative Important (IRI) obtained for the identified taxa were bivalves (22.32%), copepods (23.64%), demosponges (24.98%), while digestible material was 29.06%. The electivity index data (Ei) shows that lobsters prefer bivalves over other taxa. Lobster samples taken in the morning had a stomach fullness rate of 50%, indicating active feeding at night.

KEYWORDS: Spiny lobster; Ekas Bay; Food Preferences; Juvenile

Ananda Ghifari Leying, Vitas Atmadi Prakoso, Otong Zenal Arifin, Jojo Subagja, Kurniawan Kurniawan, Deni Irawan, Wahyulia Cahyanti, Fera Permata Putri, Ofan Bosman, Arif Wibowo, Anang Hari Kristanto, and Taufik Budhi Pramono (Department of Aquaculture, Jenderal Soedirman University)

Effects of different salinity levels on growth and physiological response of *Tor soro* juvenile

Indonesian Aquaculture Journal, 18(1), 2023, 71-77

Tor soro is one of the most economically important native freshwater fish species in Indonesia. Nonetheless, the insufficient data regarding its salinity tolerance makes a thorough investigation of this issue imperative. This research was conducted to determine the effects of salinity on the growth and physiological response of *Tor soro* juveniles at optimum salinity levels. This study used *Tor soro* (total length: 5.0 ± 0.08 cm; initial weight: 2.0 ± 0.06 g) with five salinity level treatments (0, 2, 4, 6, and 8 ppt) and the stocking density of 15 fish per aquarium (three replications). Fish were maintained for 30 days and fed with commercial aquafeed. In this study, the best growth was found in 2 ppt (length gain: 0.37 ± 0.05 cm; weight gain: 0.23 ± 0.01 g; specific growth rate in length: 1.38 ± 0.16 % day⁻¹; specific growth rate in weight: 0.78 ± 0.05 % day⁻¹) which is significantly higher than 4, 6, and 8 ppt ($p < 0.05$), but it is not significantly different from 0 ppt ($p > 0.05$). The results of the physiological response showed that there were no significant stress responses in *Tor soro* juvenile for all salinity treatments ($p > 0.05$). There was no effect of 2 ppt salinity on the growth parameters compared to controls, but salinities above ppt had a significant detrimental effect. Fish Exposure to salinities did not have any stress effect as shown by physiological indicators.

KEYWORDS: *Tor soro*; salinity; fish physiology; growth; fish stress

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Isti Koesharyani, Putu Eka Sudaryatma, Lila Gardenia, Yani Aryati, Ketut Mahardika, and Tatik Mufidah (Research Center for Fishery, National Research and Innovation Agency of Indonesia)

Simultaneous pathogen detection of shrimp viruses on cultured tiger shrimps (*Penaeus Monodon*) in Indonesia
Indonesian Aquaculture Journal, 18(1), 2023, 79-86

The multiple-pathogen infection causes severe economic impact to shrimp industry in Indonesia and worldwide due to mass mortality and multiple abnormalities of the survived infected shrimps. However, multiple-pathogen detection tools in shrimp diseases have not yet widely used. The purpose in this study was to develop and applied simultaneous detection system using multiplex polymerase chain reaction (PCR) assay from natural infections caused by white spot syndrome virus (WSSV), infectious hypodermal and haematopoietic necrosis virus (IHHNV) and monodon baculovirus (MBV) in Black tiger shrimp culture. To analyze multiple-pathogen infections in the shrimp, the study designed and used three pairs of specific primers targeting DNA virus from the shrimp diseases. All amplifications used a specific master mix for multiplex PCR assay and standardized extracted nucleic acid from the samples. This mPCR assay successfully amplified the DNA of three viruses in a single tube-run by multiplex PCR for each virus. Based on the results, the study confirms that multiple-pathogen infection contributes the highest mass mortality rather than from single infection by either WSSV, IHHNV or MBV. This study also confirms that the mPCR assay is a faster, cheaper, and efficient method to detect and subsequently prevent the spreading of multi-pathogen shrimp diseases.

KEYWORDS: IHHNV; MBV; multiplex PCR; *Penaeus monodon*; WSSV

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SEND INSTRUCTIONS FOR WRITING AND PUBLISHING ARTICLES OF INDONESIAN AQUACULTURE JOURNAL 2016 (12pt Bold)

I Nyoman Adiasmara Giri[#], Ketut Sugama^{**}, Alimuddin^{***}, and Anang Hari Kristanto^{****}

^{*}) Research and Development Institute for Mariculture, Gondol

^{**}) Center for Fisheries Research and Development, Jakarta

^{***}) Bogor Agricultural University, Bogor

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ABSTRACT (12pt Bold)

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KEYWORDS: Author guidelines; research journal; aquaculture; article template

1. Introduction

Indonesian Aquaculture Journal has a p-ISSN 0215-0883; e-ISSN: 2502-6577 with Accreditation Number: 591/AU2/P2MI-LIPI/03/2015 (period April 2015-April 2018). First published in 2006, with the publication frequency of twice a year, in June and December. (<http://ejournal-balitbang.kkp.go.id/index.php/iaj>) is a peer-reviewed Journal Indonesian Aquaculture accept manuscripts or articles in the field of aquaculture various academics and researchers nationally.

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Tables and Figures placed in the group after the text of the referenced tables or figures. Each image must be given the title of the image (Figure Caption) on the bottom of the image and numbered in Arabic numerals followed by the title picture in Indonesian and English. Each table should be titled table (Table Caption) and numbered in Arabic numerals on the top of the table followed by the title of the table in Indonesian and English. The pictures should be printed clearly warranted (font size, resolution and size of the line to be sure printed clearly). Figures and tables and diagrams / schematics should be placed among the groups corresponding column of text, or if too much is placed in the middle of the page. Tables should not contain vertical lines, while the horizontal lines are allowed but only the essentials only.

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INTRODUCTION: Introduction must contain (in order) the general background, previous literature review (state of the art) as a basis for claiming a scientific novelty of the article, a statement of scien-

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MATERIALS AND METHODS: Materials and methods contain the main ingredients used in the study and the methods used in solving the problems, including methods of analysis. The design and research methods must be clear so that it can be repeated by other researchers. When using the standard method must include the reference, and if the modification must be explained which parts are modified. Equipment that is written in this section only contains

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CONCLUSION: The conclusion describes the response of hypotheses and / or research purposes. Conclusions not contain looping of results and discussion, but rather to a summary of the research results.

Table 1. Response to selection and final mean body weight of the third generation compared to the control population of the African catfish *Clarias gariepinus* at the end of larval rearing, nursery and grow-out phases

Phases	Periods (days)	Final mean body weight (g)		Response to selection	
		Third generation	Control	Gram (g)	Percentage (%)
Larval rearing	25	0.19 ± 0.10	0.19 ± 0.07	-	-
Nursery	30	6.12 ± 2.93	5.80 ± 3.50	-	-
Grow-out	60	198.67 ± 82.82	165.22 ± 71.09	33.45	20.24

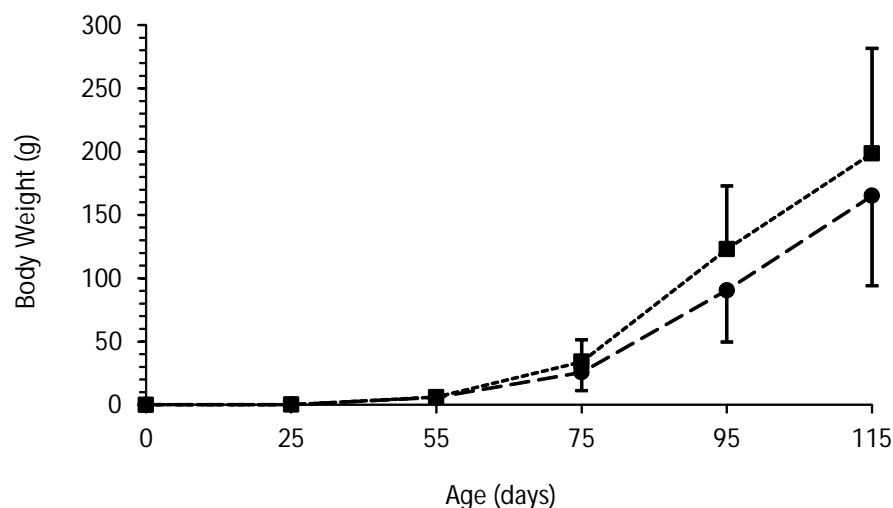


Figure 1. Growth performances based on body weight during 25 days of larval rearing phase, 30 days of nursery phase and 60 days of grow-out phase (based on samplings of 2% populations) of the third generation (■) and control population (●) of the African catfish (*Clarias gariepinus*) genetic improvement program held at Research Institute for Fish Breeding, Sukamandi. Vertical lines represent its each standard deviation

ACKNOWLEDGEMENTS: thanks mainly devoted to research funders. Acknowledgements can also be delivered to the parties that support the implementation of the research and writing of the manuscript.

REFERENCES: All references are referred to in the text of the article must be included on the List of References. References should contain reference libraries derived from primary sources (scientific journals and amounted to a minimum of 50% of the total listed below) issued 10 (ten) years. A minimum reference list contains 11 (eleven) reference. Writing in the referral system in the article text and writing a reference list using a reference management application program APA.

5. Free Writing Equations

Each equation is written centered and numbered columns are written in parentheses and placed at the end of the right margin. Equations should be written using Equation Editor in MS Word or Open Office (Primack, 1983).

$$RPS = \left(1 - \frac{\% \text{ fish mortality of vaccinated}}{\% \text{ Fish mortality of control}} \right) \times 100$$

6. Free Writing Citations / References In Text Articles

Each fetch data or quoted from other references, the author must write the reference source. References or citations written in the description / text by the author's name and the year (Irwan & Salim, 1998). If the author of more than two, then just write the name of the first author followed by "et al." (Bezuidenhout et al., 2009; Roeva, 2012). All referenced in the text must be listed in the References section.

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A reference in the form of titles:

Fridman, A. (2008). Plasma Chemistry (p. 978). Cambridge: Cambridge University Press.

In the form of reference Proceedings of the Seminar:

Roeva, O. (2012). Real-World Applications of Genetic Algorithm. In International Conference on Chemical and Materials Engineering (pp. 25-30). Semarang, Indonesia: Department of Chemical Engineering, Diponegoro University.

A reference in the form of a dissertation / thesis / theses:

Istadi, I. (2006). Development of A Hybrid Artificial Neural Networks - Genetic Algorithm for Modeling and Optimization of Dielectric-Barrier Discharge Plasma Reactor. PhD Thesis. Universiti Teknologi Malaysia.

A reference in the form of patent:

Primack, H.S. (1983). Method of Stabilizing polyvalent Metal Solutions. US Patent No. 4,373,104.

Handbook of reference in the form:

Hovmand, S. (1995). Fluidized Bed Drying. In Mujumdar, USA (Ed.) Handbook of Industrial Drying (pp.195-248). 2nd Ed. New York: Marcel Dekker.

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11. References

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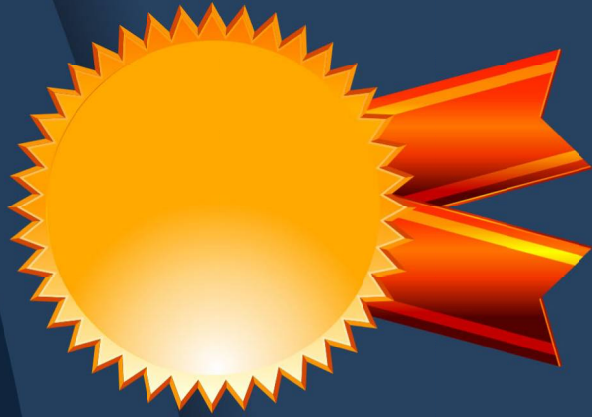
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