

# Analysis of Fish Cultivation Productivity in the Bandung City through BuruanSae Program

## ABSTRACT

This research aims to analyze the production and productivity of fish cultivation in the BuruanSae Program in Bandung City. Apart from the socio-economic characteristics of program implementers, there are several conditions and obstacles experienced by program implementers as complementary research data. The research method used is the case study method. This research was conducted in three groups of the BuruanSae Program. The implementation will be carried out in October 2023 – March 2024. The respondents in this research were 46 people who were program implementers from three groups of the BuruanSae Program. This research applies a saturated sampling method or census. The analytical method in this research uses quantitative descriptive analysis. The results showed that the WarnasariMandiri Group produced 210 kg of fish, while the Jasmine Integrated Farm Group and the Belpas 15 Group produced 10 kg and 15 kg of fish respectively. WarnasariMandiri Group with fish cultivation productivity per container of 0.2 kg/year/liter. Meanwhile, the Jasmine Integrated Farm and Belpas 15 groups fish cultivation productivity per container is 0.05 and 0.07 kg/year/liter. The R/C Ratio for the WarnasariMandiri Group is 1.14, Jasmine Integrated Farm is 2.33, and Belpas 15 is 1.25. Based on the results of the analysis, it can be concluded that the fish production of the WarnasariMandiri Group, the Jasmine Integrated Farm Group, and the Belpas 15 Group is in the medium category. The WarnasariMandiri group has the highest fish cultivation productivity per container, while the Jasmine Integrated Farm and Belpas 15 groups have lower fish cultivation productivity. Overall, the R/C Ratio of the three groups shows favorable results, namely greater than 1.

*Keywords: Production, Productivity, Socio-Economic Characteristics, BuruanSae Program*

## 1. INTRODUCTION

In order for humans to survive, the need for food is very basic. According to the 1945 Constitution of Indonesia, the state is responsible for maintaining food sovereignty, meaning ensuring that all people have access to sufficient, safe, high-quality and nutritionally balanced food. This concept includes key factors such as food availability, distribution and consumption. Food security refers to a system consisting of many different subsystems, including aspects such as availability, distribution and consumption. The main objective of this system is to ensure the stability of food supply, distribution and community access to food as well as food management at the household level, including food preparation, menus and food distribution in the home environment[1].

To prevent food shortages, guarantee food security, and ensure adequate food logistics, the government's role in developing regulations that support food security is very important. The Mayor of Bandung and his team through the Bandung City Food Security and Agriculture Service responded by launching an urban farming program called "Buruan SAE (*Sehat, Alami, Ekonomis*) (it means natural, healthier, economical)". The implementation of this

32 program is based on the Bandung Mayor's Circular regarding the implementation of  
33 integrated urban farming activities. BuruanSae is designed as a community empowerment  
34 program to help people become more independent in producing their own food needs. This  
35 is expected to make food consumption healthier, natural and economical, while creating  
36 positive environmental awareness[2].

37 Implementation of Budikdamber's idea is part of efforts to build infrastructure and provide  
38 facilities for each BuruanSae group. Budikdamber is a fish cultivation technique that uses an  
39 aquaponics system in a container such as a bucket or bathtub[3]. This approach makes it  
40 possible to grow crops and raise fish simultaneously, thereby meeting the need for vegetable  
41 and animal protein in one place and optimizing space or land use[4]. Budikdamber is  
42 considered a potential solution for the future of agriculture and fisheries, especially in areas  
43 with limited water and land resources. Budikdamber can be applied effectively in various  
44 locations such as housing, urban areas, apartments, rental houses, and refugee centers[5].  
45 In the budikdamber activity area in Pungkur Village, Regol District, Bandung City, it shows  
46 that the majority of implementers of fish farming activities in buckets experienced failure in  
47 the initial stages of fish farming activities in buckets. This is due to a lack of understanding  
48 by budikdamber implementers regarding how to raise fish, including a lack of attention to  
49 water conditions and excessive feeding, which resulted in around 300 fish fry dying[6]. If we  
50 refer to the concept of food security which explains that food must be safe, healthy and  
51 nutritious and that is also in accordance with the objectives of the BuruanSae Program, it is  
52 necessary to analyze the production and productivity of fish farming and other problems  
53 found in the research location.

54

## 55 **2. MATERIAL AND METHODS**

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### 57 **2.1 Time and Place**

58 This research was carried out in the WarnasariMandiri Group located in AntapaniKidul  
59 Village, Antapani District, Jasmine Integrated Farm Group located in Antapani Tengah  
60 Village, and the Belpas 15 Group located in Sadang Serang District, Coblong District. The  
61 duration of the research will be carried out in October – March 2024.

### 62 **2.2 Research Methods**

63 The research method used is a case study method using a survey and using a previously  
64 prepared questionnaire as a primary data collection tool. This research applies a saturated  
65 sampling method or census, where all members of the population are sampled [7].As case  
66 units are the implementers of the BuruanSae Program in the WarnasariMandiri Group, the  
67 Jasmine Integrated Farm Group, and the Belpas 15 Group.

### 68 **2.3 Type and Source Data**

69 The data in this research is quantitative data obtained from both primary and secondary  
70 sources. Primary data was collected through two methods, namely observation and  
71 interviews by filling in questionnaires. The primary data in this research are socio-economic  
72 characteristics which include age, education, experience, income, number of family  
73 members, and fish production implementing the BuruanSae Program in the  
74 WarnasariMandiri Group, Jasmine Integrated Farm Group, and Belpas 15 Group.  
75 Meanwhile, secondary data taken from various sources such as literature, journals, research  
76 reports, and relevant documents from related agencies to determine the general condition of  
77 the group, the number of program group members, and other supporting data.

### 78 **2.4 Data Analysis Methods**

79 The analysis used to explain the socio-economic characteristics of the families implementing  
80 the program and the fish production of the BuruanSae Program are descriptive analysis. For  
81 data analysis, fish farming productivity is determined using quantitative analysis. Several  
82 analytical tools used in this research are presented as follows:

83 1. Fish Cultivation Productivity

$$\Sigma \text{ Productivity (kg/year/m}^3) = \frac{\Sigma \text{ Production (kg/year)}}{\Sigma \text{ Container (liter)}}$$

84 2. R/C Ratio

$$\frac{R}{C} = \frac{\text{Total Revenue (TR)}}{\text{Total Cost (TC)}}$$

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86

### 87 3. RESULTS AND DISCUSSION

88

#### 89 3.1 Socio-economic Characteristics

90 The characteristics referred to here are socio-economic characteristics which include age,  
91 education, number of family members, income, and experience of members of the hunted  
92 sae group, namely members of the WarnasariMandiri Group, the Jasmine Integrated Farm  
93 Group, and the Belpas 15 Group.

##### 94 3.1.1 Age

95 The data obtained in the results of this study show quite a variety of ages from the  
96 respondents, details of which can be seen in Table 1.

97

**Table 1. Respondent's Age**

No	Age	Total (People)	Percentage(%)
1	Not Yet Productive (<14 years)	0 people	0
2	Productive (15-64 years)	42 people	91,3
3	Not Productive (>65 years)	4 people	8,7
<b>Total</b>		<b>46 people</b>	<b>100</b>

98

99 The distribution of farmers based on the productive age range is divided into three  
100 categories, namely the 0-14 year old group who have not yet reached productive age, the  
101 15-64 year old group who are productive age group, and the over 65 year old age group who  
102 have passed productive age[8]. Based on the data processing in the table, the majority of  
103 respondents are in the productive age group (15-64 years) with 42 people, with a percentage  
104 reaching 91.3%. The second position was occupied by 4 respondents belonging to the  
105 unproductive age group (>65 years), with a percentage of 8.7%. Meanwhile, there were no  
106 respondents under 14 years of age, so the percentage was 0%. The total number of  
107 respondents was 46 people.

##### 108 3.1.2 Education

109 The data obtained in the results of this research shows quite a variety of education from  
110 respondents with details can be seen in Table 2.

111

**Table 2. Respondent's Education**

No	Education	Total (People)	Percentage(%)
1	Elementary (Elementary/High School)	12 people	26,1
2	Medium (Senior High School)	20 people	43,5
3	High (Diploma/Bachelor/Master)	14 people	30,4
<b>Total</b>		<b>46 people</b>	<b>100</b>

112

113 Basic education is the initial stage of education which lasts for the first 9 years, consisting of  
114 6 years in elementary school (SD) and 3 years in junior high school (SMP). Then, secondary  
115 education is a continuation of basic education with a duration of 3 years in senior high school  
116 (SMA). Meanwhile, higher education is an advanced stage of secondary education which

117 includes various programs such as diploma, bachelor's, master's, doctoral and specialist  
 118 courses held at universities[9]. From the data obtained as shown in the table above, the  
 119 majority of respondents in the Buruansae group belong to the secondary education level  
 120 (SMA) as many as 20 people, with a percentage reaching 43.5%. Followed by 14  
 121 respondents with a higher education level (Diploma/Bachelor/Postgraduate), with a  
 122 percentage of 30.4%. Meanwhile, there were 12 respondents with basic education  
 123 (SD/SMP), with a percentage of 26.1%.

### 124 3.1.3 Number of Family Members

125 The data obtained in the results of this research shows quite a variety of respondents' family  
 126 members, details of which can be seen in Table 3.

127 **Table 3. Number of Family Members of the Respondent**

No	Number of Family Members	Total (People)	Percentage(%)
1	Low (1-3 people)	11 people	23,9
2	Medium (4-6 people)	35 people	76,1
3	High (>6 people)	0 people	0
<b>Total</b>		<b>46 people</b>	<b>100</b>

128  
 129 The number of family members can be grouped into three categories. First, the low group  
 130 (small family) consists of 1-3 people. Second, medium groups consist of 4-6 people. Third,  
 131 the high group (large family) consists of more than 6 people[10]. From the data obtained as  
 132 shown in the table above, the majority of respondents were 35 people with a percentage of  
 133 76.1%, belonging to the medium group with the number of family members between 4 and 6  
 134 people. Then there were 11 people with a percentage of 23.9% who were in the low group  
 135 (small families), indicating the number of family members ranged from 1 to 3 people. There  
 136 were no respondents who belonged to the high group (large family), which means no one  
 137 had a family with more than 6 members.

### 138 3.1.4 Income

139 The data obtained in the results of this research shows quite a variety of respondents'  
 140 incomes, details of which can be seen in Table 4.

141 **Table 4. Respondent's Income**

No	Income	Total (People)	Percentage(%)
1	Low (<IDR.1.500.000)	0 people	0
2	Medium (IDR 1.500.000- 2.500.000)	25 people	54,3
3	High (IDR 2.500.000-3.500.000)	16 people	34,8
4	Very High (>IDR.3.500.000)	5 people	10,9
<b>Total</b>		<b>46 people</b>	<b>100</b>

142  
 143 Family income is divided into 4 groups based on the monthly income earned. The first group  
 144 is low, with an income of less than IDR 1,500,000. The second group is medium, with an  
 145 average income of between IDR 1,500,000 to IDR 2,500,000. The third group is high, with  
 146 an average income of between IDR 2,500,000 to IDR 3,500,000. And the last group is very  
 147 high, with an income of more than IDR 3,500,000[10].The majority of respondents, 25 people  
 148 with a percentage of 54.3%, had a family income in the range of IDR 1,500,000 to IDR  
 149 2,500,000. Followed by 16 respondents with a percentage of 34.8% who had a family  
 150 income in the range of IDR 2,500,000 to IDR 3,500,000. A total of 5 respondents with a  
 151 percentage of 10.9% had a family income of more than IDR 3,500,000, which is classified as  
 152 a very high income category. Meanwhile, there were no respondents who had a family  
 153 income of less than IDR 1,500,000. These findings provide an overview of the distribution of

154 family income in the BuruanSae group, which is important for understanding the fish  
 155 consumption patterns of each family.

### 156 3.1.5 Experience

157 The data obtained in the results of this research shows the length of experience of  
 158 respondents as members of the BuruanSae group, details of which can be seen in Table 5.

159 **Table 5. Respondent's Experience**

No	Experience	Total (People)	Percentage(%)
1	Less Experienced (<1 year)	0 people	0
2	Enough (1-2 year)	0 people	0
3	Experienced (>2 year)	46 people	100
<b>Total</b>		<b>46 people</b>	<b>100</b>

160  
 161 The recorded data regarding the length of experience as a member of the sae hunted group  
 162 shows an interesting pattern. There are no members who are classified as less experienced  
 163 (<1 year) or quite experienced (1-2 years). On the other hand, all members, namely 46  
 164 people or 100%, have experience that can be considered experienced, with more than 2  
 165 years of experience. These findings highlight the consistency and dedication of members in  
 166 the BuruanSae group over a long period of time. Analysis of these patterns can provide deep  
 167 insight into the internal dynamics of the group, as well as strengthen understanding of the  
 168 commitment and motivation of members.

### 169 3.2 Cultivation Profile

#### 170 3.2.1 Seeds and Feed

171 In this research, Sangkuriang catfish seeds were initially scattered into buckets and ponds to  
 172 start the cultivation process. In the early stages of fish cultivation, the seeds stocked at the  
 173 beginning have different characteristics between the BuruanSae group. The size of the  
 174 seeds and the number of seeds stocked at the beginning of the cycle are shown in Table 6.

175 **Table 6. Seeds**

Group	Seed Size (cm)	Total of Seeds Stocked
WarnasariMandiri	9-10	50 fish/bucket 500 fish/pond
<i>Jasmine Integrated Farm</i>	10-12	25 fish/bucket
Belpas 15	5-10	50 fish/bucket

176  
 177 The WarnasariMandiri Group uses seeds with an average size of 9-10 cm, while the  
 178 Jasmine Integrated Farm Group uses seeds with an average size of 10-12 cm, and the  
 179 Belpas 15 Group uses seeds with an average size of 5-10 cm . The number of seeds  
 180 stocked also varies between BuruanSae groups. The WarnasariMandiri Group has set a  
 181 stocking density of 50 fish/bucket and 500 fish/pond with a total of 15 buckets and a total of  
 182 6 ponds. Meanwhile, the Jasmine Integrated Farm Group uses a stocking density of 25  
 183 fish/bucket with a total of 10 buckets, and the Belpas Group 15 sets a stocking density of 50  
 184 fish/bucket with a total of 10 buckets.

185 There are variations in the type of feed used by each BuruanSae group. The types of feed  
 186 used by each BuruanSae group are shown in Table 7.

187 **Table 7. Feed**

Group	Artificial Feed	Natural Feed
WarnasariMandiri	Floating Pellets	Papaya Leaf
<i>Jasmine Integrated Farm</i>	Floating Pellets	Maggot

188  
189 The WarnasariMandiri Group, Jasmine Integrated Farm Group, and Belpas 15 Group use  
190 floating pellets as the main artificial feed. However, there are differences in the use of natural  
191 feed. The WarnasariMandiri Group uses powdered papaya leaves as additional natural feed,  
192 the Jasmine Integrated Farm Group uses maggot feed, while the Belpas 15 Group does not  
193 use additional natural feed. The addition of papaya leaf powder has a significant impact on  
194 the growth of fish length and weight. Optimal treatment showed an increase in length growth  
195 of 2.69 gr and 3.51 cm. In addition, specific weight and length increased to 3.89 gr and 5.89  
196 cm, while FCR was 0.517[11]. The effectiveness of using maggots as additional feed to feed  
197 sangkuriang catfish seeds (*Clarias gariepinus*) can be used as an alternative in reducing the  
198 cost of purchasing commercial feed, because by providing additional feed maggots provide  
199 higher weight growth rates, provide good length growth rates, increase survival. Rate (SR),  
200 increases the feed efficiency value, and reduces the FCR value[12].

### 201 3.2.2 Mastery of Technology

202 In the Jasmine Integrated Farm Group there are several discrepancies in mastery of  
203 technology. Among them are the protein content of the feed which is not paid attention to,  
204 the frequency of feeding which is only 2 times a day from the start of the cycle until harvest,  
205 the amount of feed which is measured manually until the catfish are full, pest control, and  
206 fish disease control which is not known how it works. In Belpas Group 15, there was a  
207 discrepancy in the amount of feed given according to the percentage of fish weight. In  
208 Belpas Group 15, the amount of feeding is still measured manually until the catfish are full.  
209 The WarnasariMandiri group is very good at mastering technology.

210 For seeds measuring 10-12 cm, the best protein content in the feed is at least 30%. Then  
211 the frequency of feeding can be done 4 times a day for seeds that have just been sown for 2  
212 weeks, then feeding is done 2 times until the catfish are harvested. Then the amount of  
213 feeding is done using a percentage or satiation method of 80%, which means the catfish are  
214 not 100% full and will be added or recalculated every 3 days. Pest control is carried out  
215 during pool preparation and during enlargement, including processing the bottom of the pool  
216 and drying it completely, so that all organisms die and improving the structure of the bottom  
217 soil so that toxic gases escape. Then to control the disease you can use hand dipping, short  
218 bathing, long bathing, and pond treatment [13].

### 219 3.3 Fish Production

220 Fish production here includes the production of fish for consumption and for sale within one  
221 year to the BuruanSae group. The fish production in one year in the BuruanSae group is  
222 presented in Table 8.

223 **Table 8. Fish Production**

Group	Fish Production for Consumption (kg)	Fish Production for Consumption (fish)	Fish Production for Sale (kg)	Fish Production for Sale (fish)
WarnasariMandiri	-	-	210 (180 from pond dan 30 from bucket)	1.470 (1.260 from pond dan 210 from bucket)
<i>Jasmine Integrated Farm</i>	-	-	10	80
Belpas 15	-	-	15	105

224  
225 In the context of the number of fish produced, the harvested fish cultured in buckets from the  
226 WarnasariMandiri Group, Jasmine Integrated Farm Group, and Belpas 15 Group are not

227 intended for direct consumption by members or families implementing the program.  
 228 However, the harvest is intended for sale. The WarnasariMandiri group produced 210 kg  
 229 (equivalent to 1,470 fish), while the Jasmine Integrated Farm Group and Belpas 15 Group  
 230 produced 10 kg (equivalent to 80 fish) and 15 kg (equivalent to 105 fish) respectively. This  
 231 difference reflects the scale of production and focus of economic activities of each group,  
 232 where the WarnasariMandiri group is more oriented towards production for sale as a form of  
 233 business activity. For the Jasmine Integrated Farm Group and the Belpas Group, 15  
 234 harvests are for sale, but the harvests are sold at below market prices in the context of  
 235 community food security. The proceeds from the sale are used for operational fish farming  
 236 activities in group buckets.

237 The average harvest of catfish in bucket fish farming is 1-2 kg/bucket[4]. The  
 238 WarnasariMandiri Group has 15 buckets of cultivation buckets with the number of fish  
 239 produced from a total of 15 buckets being 30 kg or 2 kg/bucket. Then the Jasmine Integrated  
 240 Farm Group has 10 buckets of cultivation buckets with the number of fish produced from a  
 241 total of 10 buckets being 10 kg or 1 kg/bucket. For the Belpas Group, the 15 buckets for  
 242 cultivation are 10 buckets with the number of fish produced being 15 kg from a total of 10  
 243 buckets or 1.5 kg/bucket. This means that if you look at the aspect of the number of fish  
 244 produced, the WarnasariMandiri Group, the Jasmine Integrated Farm Group, and the Belpas  
 245 15 Group are in the medium category.

#### 246 **3.4 Fish Cultivation Productivity**

247 The fish cultivation productivity per container (kg/year/liter) in the BuruanSae group is  
 248 presented in Table 9.

249

**Table 9. Fish Cultivation Productivity**

Group	Fish Production (kg/year)	ΣContainer (liter)	Productivity (kg/year/liter)
WarnasariMandiri	840	4.200	0,2
Jasmine Integrated Farm	40	800	0,05
Belpas 15	60	800	0,07
<b>Total</b>	<b>940</b>	<b>5.800</b>	

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251 Analysis of fish cultivation productivity per container is an important aspect in evaluating  
 252 production efficiency and performance at a specific farming unit scale. From the data  
 253 presented, the WarnasariMandiri Group stands out with a productivity of 0.2 kg/year/liter,  
 254 indicating optimal use of containers with relatively high fish yields, namely 840 kg per year in  
 255 a total container of 4,200 liters. On the other hand, the Jasmine Integrated Farm Group and  
 256 the Belpas 15 Group have lower productivity, respectively 0.05 kg/year/liter and 0.07  
 257 kg/year/liter. Overall it is categorized as low because productivity is below 0.5 kg/year/liter.

258 This could be due to the level of fish density being too high, especially in the tarpaulin pond  
 259 cultivation media of the WarnasariMandiri Group. The death of catfish fry can be caused by  
 260 high competition between individual fish for food, space and oxygen. This results in some  
 261 fish seeds being unable to adapt and losing in competition, resulting in death[14]. Then the  
 262 low productivity of fish cultivation in bucket cultivation media can be due to irregular feeding.  
 263 Because the average frequency of feeding for group members is only 2 times a day and also  
 264 the amount of feeding at the time of feeding is excessive (until the catfish are full)[15].

#### 265 **3.5 R/C Ratio**

266 Farmers or breeders can be considered as profit-oriented business people, where the main  
 267 goal is to achieve maximum profit. Economic efficiency is achieved when available  
 268 resources are utilized optimally to achieve these goals [16]. The total revenue, total costs,  
 269 and R/C ratio in the BuruanSae group are presented in Table 10.

Table 10. R/C Ratio

Group	Revenue (IDR/year)	Cost (IDR/year)	R/C Ratio
WarnasariMandiri	16.000.000	14.000.000	1,14
<i>Jasmine Integrated Farm</i>	1.400.000	600.000	2,33
Belpas 15	1.500.000	1.200.000	1,25
<b>Total</b>	<b>18.900.000</b>	<b>15.800.000</b>	<b>4,72</b>
<b>Average</b>	<b>6.300.000</b>	<b>5.266.666,67</b>	<b>1,57</b>

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If  $R/C > 1$  means the farming is profitable, if  $R/C = 1$  it means the farming is breaking even, and if  $R/C < 1$  means the farming is making a loss [17]. The WarnasariMandiri group produced an R/C Ratio of 1.14. This shows that fish farming businesses in this group are able to achieve profits. On the other hand, the Jasmine Integrated Farm Group and the Belpas 15 Group showed more profitable performance with an R/C Ratio of 2.33 and 1.25 respectively. The R/C Ratio of the three groups is above 1 because the costs incurred for cultivating fish in buckets are low and maintenance is simple. Cultivating fish in buckets does not require a large amount of capital, is simple to maintain, and does not take up space[18]. The devices and equipment used in budikdamber are also simple, easy to obtain, and can use second-hand, unused items, thereby reducing operational costs [19].

#### 4. CONCLUSION

The WarnasariMandiri group has a fish cultivation productivity per container of 0.2 kg/year/liter, indicating optimal use of containers with relatively high fish yields, namely 840 kg/year with a total container of 4,200 liters. Then the Jasmine Integrated Farm Group and the Belpas 15 Group have lower productivity, respectively 0.05 kg/year/liter with fish yields of 40 kg/year with a total container of 800 liters and 0.07 kg/year/liter with fish yield 60 kg/year with a total container of 800 liters. In the R/C Ratio analysis, overall of the 3 groups the R/C Ratio is  $>1$ , which means it is profitable.

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#### AUTHORS' CONTRIBUTIONS

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Asep Agus HandakaSuryana designed the study, performed the statistical analysis, wrote the protocol, andwrote the first draft of the manuscript. Mochamad Zidane Fahrullrfy managed the analyses ofthe study and managed the literature searches. All authors read and approved the final manuscript.

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#### REFERENCES

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- [1] E. Pranoto, Potential of Agricultural Commodity Areas in Supporting Agribusiness-Based Food Security in Banyumas Regency. Semarang: Diponegoro University, 2008.
- [2] S. D. R. Putri, N. Y. Yuningsih, and I. Darmawan, "Implementation of the Buruan Sae (Healthy, Natural, Economical) Program in Increasing Food Security in Bandung City in 2020-2021," J. Adm. Govt., vol. 3, no. 1, p. 15, 2023, [Online]. Available: [https://bphn.go.id/data/documents/peningkatan\\_ked](https://bphn.go.id/data/documents/peningkatan_ked)
- [3] L. Handayani and 2018, "Utilization of Narrow Land with an Aquaponic Cultivation System," Pros. Semin. Nas. Has. Devotion. 2018, pp. 118–126, 2018.
- [4] I. E. Susetya and Z. A. Harahap, "Application of budikdamber (cultivating fish in buckets) for limited cultivation land in Medan City," Abdimas Talent., vol. 3, no. 2, pp. 416–420, 2018.

- 314 [5] T. Widiyanto and L. A. Imron P, "Mentoring and Training to Increase Food Security with  
315 BUDIkdAMBER in Palur Village, Mojolaban District, Sukoharjo Regency," *Wasana*  
316 *Nyata*, vol. 5, no. 1, pp. 45–48, 2021, doi: 10.36587/wasananyata.v5i1.858.
- 317 [6] M. Ilyasa, I. Maulina, and Y. Mulyani, "Fish Cultivation Activities in Buckets  
318 (Budikdamber) in the Buruan Sae Urban Farming Program in Regol District, Bandung  
319 City," *Pros. Semin. Nas. Has. Researcher. and Servant. To. Masy.*, pp. 132–140,  
320 2022.
- 321 [7] Sugiyono, *Educational Research Methods Quantitative, Qualitative and R&D*  
322 *Approaches*. Bandung: Alfabeta, 2014.
- 323 [8] I. B. Mantra, *General Demography*. Yogyakarta: Student Library, 2004.
- 324 [9] A. N. Saleh, *Education and Society*. Yogyakarta: Sabda Media, 2011.
- 325 [10] Central Statistics Agency, *People's Welfare Statistics*. Coal: Central Statistics Agency,  
326 2016.
- 327 [11] M. B. Mubaraq et al., "The Effect of Adding Papaya Leaf Powder (*Carica papaya*) to the  
328 Feed to Increase the Growth of Catfish (*Clarias* sp.) The Effect of Adding Papaya  
329 Leaf Powder (*Carica Papaya*) to the Feed to Increase the Growth of Catfish ( *Clarias*  
330 sp . ) Sector pe," vol. 6, no. October, pp. 83–92, 2021.
- 331 [12] L. E. Berampu, E. Patriono, and R. Amalia, "Providing a combination of maggot and  
332 commercial feed for the effectiveness of supplementary feeding for Sangkuriang  
333 catfish (*Clarias gariepinus*) seeds by catfish cultivator groups," *Sriwij. Biosci.*, vol. 2,  
334 no. 2, pp. 1–15, 2022, doi: 10.24233/sribios.2.2.2021.315.
- 335 [13] Suprpto and L. S. Samtafsir, *Secrets of Successful Catfish Cultivation Technology*.  
336 Depok: Agro 165, 2013.
- 337 [14] F. Aini, R. Asra, H. Maritsa, A. I. Yusuf, and A. Sazali, "Implementation of Fish  
338 Aquaculture Techniques in Bucket (Budikdamber) in The Community of Talang  
339 Inuman Muara Bulian Village," *J. Rural Urban Community Empower.*, vol. 2, no. 1,  
340 pp. 29–36, 2020, [Online]. Available:  
341 [https://scholar.google.com/scholar?hl=id&as\\_sdt=0%2C5&q=Penerapan+Teknik+Bu  
342 didayalkanDalam+Ember+%28Budikdamber%29+Di+Lingkungan+Masyarakat+Desa  
343 TalangInumanMuaraBulian&btnG=](https://scholar.google.com/scholar?hl=id&as_sdt=0%2C5&q=Penerapan+Teknik+Bu+didayalkanDalam+Ember+%28Budikdamber%29+Di+Lingkungan+Masyarakat+Desa+TalangInumanMuaraBulian&btnG=)
- 344 [15] Q. Liswahyuni, A., Mapparimeng, Ayyun, "Survival Rates and Growth Patterns of  
345 Catfish Seedlings (*Clarias gariepinus*) in Different Densities in the BUDIkdAMBER  
346 System," *Fish. Aquat. Stud.*, vol. 1, no. 2, pp. 051–059, 2021.
- 347 [16] A. Tasman and H. Aima, *Managerial Economics with a Mathematical Approach*.  
348 Depok: Rajawali Press, 2018.
- 349 [17] K. Suratiyah, *Agricultural Science*. Jakarta: Self-Help Spreader, 2015.
- 350 [18] N. Hasanah et al., "Implementation of the Budikdamber System in the Home Yards of  
351 the Jayagiri Village Community to Increase Family Food Security," *J. Pus. Inov.*  
352 *Mass.*, vol. 4, no. 2, pp. 60–68, 2022, doi: 10.29244/jpim.4.2.60-68.
- 353 [19] S. Suryanti, A. Umami, R. Firmansyah, and R. Widyasaputra, "Empowerment of  
354 organic farming with the hydroganic budikdamber model in the era of the Covid-19  
355 pandemic," *J. Agro Dedik. Mass.*, vol. 1, no. 2, pp. 44–50, 2020, [Online]. Available:  
356 <http://journal.ummat.ac.id/index.php/JADM/article/view/2966/2139>  
357