Ethnobotany of Medicinal Seaweeds of Ilocos Norte, Philippines

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The Ilocano people of Ilocos Norte in the Philippines have high regard for seaweed use. The traditional seaweed medicines used by them are old and time-tested, albeit little explored. This study examines the selection of seaweeds associated with a defined folk knowledge and their source availability in Ilocos Norte. Thirty-four (34) seaweed species were traditionally perceived as medicinal for eight types of emic indications, almost 80% of which were edible. Three major groups, i.e. rhodophytes (16 spp.), ochrophytes (7 spp.), and chlorophytes (11 spp.), of 12 families and 20 genera constituted the list. Most species were used for digestive, pulmonary, and glandular-related complaints. The Ilocano residing Pagudpud and Burgos were the most familiar in terms of the number of used species. Caulerpa racemosa (ar-arusip) was the most familiar seaweed used as a cough or asthma reliever. Caulerpa racemosa, Hydroclathrus clathratus, and Gracilaria edulis had the highest use value, whereas Codium intricatum, Gelidiella acerosa, and C. racemosa had the highest fidelity level scores. The distribution of taxa in dry and wet seasons markedly varied per site. Gelidiella acerosa was the only species growing on all sites year-round. Correspondence between folk use and phytochemical activity was inferred in nearly all listed species. The information presented here will allow continued validations and tests of folk medicinal seaweeds for new drugs and may bring additional armamentarium to the Philippine pharmacopeia.

Keywords: drug discovery, Ilocano, medicinal seaweed, seaweed distribution

INTRODUCTION

The Ilocano is one of the major indigenous peoples in the Philippines. Their major residential areas center in northwestern Luzon, whose coastal areas are home to a diverse seaweed flora. The important role of seaweeds among the Ilocano, particularly as edibles, has represented the focus of a number of studies (Blanco 1938; Moreland 1979; Agngarayngay 1983; Hurtado-Ponce 1983; Tungpalan 1983; Agngarayngay et al. 2015; Gamus et al. 2021). The list of known edible seaweed species in northwestern Luzon currently stands at 96 (Dumilag 2018) and, thus far, the highest record for the Philippines. The fidelity of seaweed use is strong among the Ilocano that, even when they move to other places, their folk knowledge practices persisted. Since the diaspora beginning in the early 1900s in Hawaii (Bunker 1928; Alcantara 1973), the Ilocano have maintained their own cooking and eating habits, despite the seemingly strong pressure to change them (Howard 1967; Baxa 1973). As the homeland seaweed edibles markedly differ from Hawaii, the Ilocano were compelled to substitute their...
seaweed choices limited to what was only available in the area (Miller et al. 1946). Indeed, Abbot (1978) succinctly characterized Ilocano (sic. Filipino) migrants to Hawaii as “… a group more commonly encountered at the seashore than Hawaiians, more curious about uses of seaweeds, more interested in a great variety …”

Seaweeds have been used as herbal medicine by various cultural groups for different types of discomforts (Tungpalan 1983; Chengkui and Junfu 1984; Abbott 1996; Anggadiredja 2009). The benefits of medicinal seaweeds were traditionally attributed to their high-value compounds (e.g. lectin, kanoids, glycolipids, and vitamins) and extracts (e.g. algin, carrageenan, and agar) (Holdt and Kraan 2011). In turn, health care researchers are prompted to develop seaweed-based products for the prevention and treatment of diseases (Smit 2004; Liu et al. 2012; Rao and Periyasamy 2020; Cotas et al. 2021; Mourelle et al. 2021).

With currently 183 hospitals registered in Ilocos Norte (DOH 2021), most of the locals more likely prefer to be treated for serious diseases by doctors in hospitals. However, despite the advancement of modern medicine, many Ilocano still rely on traditional healing systems (Vendivil 2002). A total of 13 seaweed species were presently perceived to have medicinal value in Ilocos Norte (Tungpalan 1983). These include D. simplex, Gracilaria eucheumatoides, G. arcuata, G. corinipifolia, G. textorii, Gracilaropsis longissima (as Gracilaria verrucosa), Halimeda macroloba, H. discoidea, H. tuna, H. cuneata, and three unidentified Sargassum species. Other taxa (e.g. Codium edule, Co. intricatum, Co. repens, Hydroclathrus clathratus, and Palsada perforata) sourced from Ilocos Norte have already undergone phytochemical studies (Ramil 2014; Ragasa et al. 2016; Bayro et al. 2019; Vasquez et al. 2019; Vasquez and Lirio 2020). Notwithstanding the fact that seaweeds are potential drug sources, information about folk medicinal seaweed in the area is limited. Hence, this study aimed at documenting the ethnobotanical knowledge related to the use of local medicinal seaweeds in Ilocos Norte and compiling this information by applying quantitative indices to compare ethnobotanical data.

MATERIALS AND METHOD

Study Site

Ilocos Norte is situated in the northwesternmost boundary of Luzon Island, Philippines (Figure 1). It has a land area of about 3.3 km². The study area extended from Saud in the far north of Pagudpud (18.59° N, 120.80° E) towards Badoc Island (17.92° N, 120.41° E) located at the southwestern area of Ilocos Norte. Six sites consisting of 12 stations were selected for specimen collection and ethnobotanical survey.

Data Collection

The monthly fieldwork was carried out between November 2000–November 2001. Prior informed consent was followed for each survey done. A purposive sampling technique was employed to locals initially encountered and subsequently requested an introduction to other persons knowledgeable about the use of medicinal seaweeds (snowball survey). A questionnaire was prepared in the Ilocano language. The questionnaire used included open and closed questions. The following information was sought: the respondent demographic profile, local names of medicinal seaweeds, preparation or administration, and folk medical indication of seaweeds.
All seaweed species cited as medicinal were collected from the field. Species identification was done by morpho-anatomical observation and by consulting regional references (Cordero 1977; Marcos-Angaraynay 1983; Tungpalan 1983; Trono 1997). Species names were consolidated under the currently accepted nomenclature based on Algaebase (Guiry and Guiry 2022). Voucher specimens were prepared following Trono and Ganzon-Fortes (1988) and were lodged at the University of Santo Tomas Herbarium with replicates kept as a personal collection of the second author.

The species listed in this study were compared with those previously mentioned in ethnobotanical and various pharmacological or phytochemical studies. A total of 157 articles were consulted.

**Seaweed Distribution**
Field observations covered two seasons: wet (May–October) and dry (November–April). The species’ seasonal distribution was categorized on the basis of the actual observation or collection of a given species over the total number of months per season (6 mo). The following description was used: abundant (observed for 5–6 mo), few (2–3 mo), recorded once, and absent.

**Data Analysis**
The data collected during the field study were sorted in Microsoft® Excel. Three quantitative ethnobotanical indices were measured – namely, use value (UV), fidelity level (FL), and consensus factor index (ICF). UV quantifies the relative importance of a species and is expressed as the summation of use reports by each respondent for species over the total number of respondents (Phillips and Gentry 1993; Rossato et al. 1999). FL quantifies the importance of a species for a particular use and is expressed as the ratio between the number of informants claiming the use of a seaweed species as sourced medicine and the total number of informants who mentioned the species for any other purpose (Friedman et al. 1986). Spearman’s ranked correlation analysis was used to evaluate the relationship between the computed UV and FL values. Lastly, ICF followed the formula by Heinrich et al. (1998) as \( ICF = \frac{Nur - Nt}{Nur - 1} \), where Nur refers to the total number of use citations per disease category and Nt represents the total number of species used in the respective category.

The total number of recorded medicinal seaweed species known from each site was compared pairwise using Jaccard’s coefficient of similarity (JCS) (Jaccard 1908) and is computed as \( JCS = \frac{S_x \cap S_y}{S_x + S_y} \), where \( S_x \) and \( S_y \) are the number of medicinal seaweed species known from site X and Y, respectively, and \( S_c \) is the number of medicinal seaweed species common to both sites. The same index was used to compare the collected data with those previous ethnobotanical records and published pharmacological and phytochemical studies that used or mentioned similar species.

**RESULT**

**Demographic Profile**
A total of 278 respondents were interviewed (131 male, 147 female). This included five herbalists (mang-ngagas), 120 fishers, 49 farmers, 38 with other occupations (e.g. teacher, government officer, driver, construction worker, etc.), and 66 housewives. By site, the respondents were distributed as follows: Pagudpud (77), Burgos (39), Pasuquin (28), Paon (51), Currimao (47), and Badooc (36). Most of the informants were in the age range of above 60 yr (35.61%), 51–60 yr (27.70%), and 41–50 yr (21.94%). An age range of 30–40 yr old and those below 30 yr comprised the remaining 8.27% and 6.47% of the total respondents, respectively. Ethnobotanical knowledge of the use of medicinal seaweeds was inherited directly by all the respondents from their ancestors (parents or grandparents) through oral traditions.

**Medicinal Seaweeds and Their Uses**
The medicinal uses of 34 seaweed species extracted from the informants are listed in Table 1 – including taxonomic group, vernacular name, and medical value. The list also contained 27 (79.41%) species with culinary use. The seaweed taxa were distributed among three major divisions consisting of 12 families and 20 genera. Rhodophytes (47.06%) were the most dominant group, followed by chlorophytes (32.35%) and ochrophytes (20.59%). All seaweeds with medicinal value were directly collected from the wild by the local people, whenever required. Some species such as *Caulerpa racemosa* (ar-arusip) and *Codium intricatum* (pok-poklo) are regularly sold in the local markets (Figure 2).

Local (emic) disease categories fell into eight categories (Table 2). Fourteen (14) species (41.18%) had therapeutic uses against digestive complaints – including indigestion, diarrhea, and stomach aches. There were nine species (26.47%) known to treat respiratory disorders (cough or asthma), whereas seven taxa (20.59%) were believed to cure glandular disorder (goiter). The most popular species, *C. racemosa*, used to cure cough or asthma, was cited by 164 (or 58.99%) respondents across all the surveyed sites. Other important uses included treatment for sexual dysfunction (4 spp. or 11.46%) and dermatological problems such as pruritis, skin allergy, and other skin infection (3 spp.)
A list of medicinal seaweeds in Ilocos Norte, Philippines, including scores of UV, FL, and other folk and modern use of each species.

<table>
<thead>
<tr>
<th>No.</th>
<th>Species name</th>
<th>Local name</th>
<th>Disease treated</th>
<th>UV</th>
<th>FL</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Caulerpa racemosa</td>
<td>Ar-arusip*</td>
<td>Cough, asthma, cough-infection                                                  0.59</td>
<td>65.37</td>
<td>Claimed remedies for anti-microbial, blood pressure, anesthetics (Trono 1997; Novacek 2001); effective as a sunscreen component (Ersalina et al. 2020); lipid and polysaccharides exhibiting anti-no-ciceptive and anti-inflammatory activities (Nagappan and Vairappan 2014; Ribeiro et al. 2014; Fernando et al. 2018) and larval and anti-microbial compounds (Wang et al. 2007a; Nagaraj and Osborne 2014; Ramachandran et al. 2019); contains lipoxygenase inhibitor potential against asthma (Cengiz et al. 2011); lowers total cholesterol and blood glucose (Perrutasari et al. 2021); shows strong anti-tumor activity (Ji et al. 2008); synthesized metal nanoparticles can be employed for dye removal (Edison et al. 2016) and drug development for cancer (Manikandakrishnan et al. 2019), snake antidote (Pires et al. 2013)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Caulerpa serrulata</td>
<td>Ar-arusip, gal-galak-gak*</td>
<td>Cough, asthma                                                                      0.13</td>
<td>6.94</td>
<td>Contains lectin which can be used against asthma and allergy (Djabayan-Djibeyan et al. 2018) and caulerpin, a potential compound for cancer therapy (Su et al. 1997; Mehra et al. 1999)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Caulerpa serrulata</td>
<td>Ar-arusip*</td>
<td>Cough, asthma                                                                      0.14</td>
<td>26.48</td>
<td>Folk remedy for hypertension and insect-repellent (Isnail 1995); potential for medicine controlling diarrhea and food poisoning (Darah et al. 2004); shows telomerase-inhibiting activity potential for anti-cancer agent (Kanehawa et al. 2000)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Codium arabicum</td>
<td>Pok-poklo*</td>
<td>Goiter, goitre                                                                      0.12</td>
<td>47.77</td>
<td>Folk remedy as vermifuge, treatment for urinary diseases (Anggadireja 2009); oxygenated cholesterols indicate potential agents aid to reduce viability of cancer cells (Sheu et al. 1995)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Codium intricatum</td>
<td>Pok-poklo*</td>
<td>Goiter, goitre                                                                      0.17</td>
<td>84.56</td>
<td>Claimed remedies for anti-helminthic, anti-bacterial, and anti-tumor [probably to include Codium edule in Trono (1997)]; constitutes potential anti-bacterial and anti-oxidant compounds (Ramil 2014) (as Codium repens (Arguelles 2020)) and for cancer treatment (Vasquez and Lirio 2020)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Codium cf. tenue</td>
<td>Pok-poklo*</td>
<td>Goiter, goitre                                                                      0.16</td>
<td>31.42</td>
<td>Extracts show activity against Gram-positive bacteria (Vlachos et al. 1997)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Halimeda incrassata</td>
<td>Sal-salamu-gui</td>
<td>Goiter, goitre                                                                      0.06</td>
<td>49.07</td>
<td>Lipid fractions show anti-inflammatory activities (Thanh et al. 2021)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Halimeda macroroba</td>
<td>Sal-salamu-gui</td>
<td>Goiter, goitre                                                                      0.06</td>
<td>49.07</td>
<td>Folk medicine as vermifuge (Tungpanal 1983); inhibits production of thiobarbituric reactive substances (Barro et al. 2001) and reactive oxygen species (Fallarero et al. 2003)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Halimeda opuntia</td>
<td>Sal-salamu-gui</td>
<td>Goiter, goitre                                                                      0.06</td>
<td>49.07</td>
<td>Shows anti-microbial, anti-plasmid, and cytotoxic activities (Mtolera and Semesi 1996; Anggadireja 2009; Ravikumar et al. 2011; Selim 2012); constitutes anti-microbial (Anggadireja 2009); inhibits production of thiobarbituric reactive substances (de Oliveira e Silva et al. 2012)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Ulva lactuca</td>
<td>Gam-gamet, lumot*</td>
<td>Insect bite, pruritis, skin infection                                              0.18</td>
<td>53.47</td>
<td>With similar folk remedies to that of U. australis, including treatment for epistaxis (Anggadireja 2009); shows inhibitory activities to micro-organisms (Awad 2000; Vallinayagam et al. 2009; Barot et al. 2016; Anjali et al. 2019); synthesized silver and zinc nanoparticles and can be employed for malarial and dengue control (Muragan et al. 2015; Ishwarya et al. 2018); inhibits enzymes related to diabetes and obesity (Belhadj et al. 2013); indicates protective and healing effects in liver and kidney injuries (Kammoun et al. 2019); inhibits production of reactive oxygen species causing myocardial damage (Widyaningsih et al. 2017) and cancer (Wang et al. 2013); potential for male infertility therapy (Ghareeb et al. 2021)</td>
<td></td>
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<tr>
<td>12</td>
<td>Padina australis</td>
<td>Lap-lapayag</td>
<td>Diarrhea&lt;sup&gt;a,i,s&lt;/sup&gt;</td>
<td>0.11</td>
<td>10.03</td>
<td>Folk remedy for goiter and scrofula (Anggadiredja 2009); fucoidan extracts stimulate intestinal immunological activities (Yuguchi et al. 2016); contains anti-microbial compounds (Chiao-Wei et al. 2011; Saloso et al. 2020); anti-oxidant agents (Junopia et al. 2020; Hassan et al. 2021); mitigating anti-depressant effects (Subermaniam et al. 2020); fucoxanthin reducing viability of cancer cells (Jaswir et al. 2011) and other compounds inhibiting cell proliferation and vascular formation (Canoy and Bitacura 2018)</td>
</tr>
<tr>
<td>13</td>
<td>Padina minor</td>
<td>Lap-lapayag</td>
<td>Diarrhea&lt;sup&gt;a,i,s&lt;/sup&gt;</td>
<td>0.09</td>
<td>6.33</td>
<td>Shows gastroprotective activities (Amornlerdpison et al. 2009); contains hypotensive, anti-oxidant, and anti-inflammator agents (Amornlerdpison et al. 2007; Peerpornpisal et al. 2010) and other phytocompounds with potential for various medicinal applications (Labiaga et al. 2021)</td>
</tr>
<tr>
<td>14</td>
<td>Hydroclathrus clathratus</td>
<td>Bal-balulang*</td>
<td>Skin allergy&lt;sup&gt;a,d,b,o,p&lt;/sup&gt;</td>
<td>0.30</td>
<td>44.67</td>
<td>Folk remedy as vermifuge, for goiter, scrofula (Anggadiredja 2009), and as insect repellent (Trono 1997); constitutes anti-oxidant (Ramil 2014; Alharbi 2020), anti-microbial (Anggadiredja 2009), and anti-viral compounds (Wang et al. 2007b; Vimala and Poonghuzhal 2017); inhibits production of herpes virus (Wang et al. 2010) and cancer cells (Wang et al. 2007b; Jayasouriya et al. 2011, 2012; Kim et al. 2012)</td>
</tr>
<tr>
<td>15</td>
<td>Pseudochnospora implexa</td>
<td>Sap-sapuyot*</td>
<td>Cough, asthma&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>0.19</td>
<td>25.33</td>
<td>Shows anti-microbial activity against Streptococcus pyogenes, Streptococcus pneumoniae, and Trichomonas foetus (Reichelt and Borowitzka 1984)</td>
</tr>
<tr>
<td>16</td>
<td>Sargassum cf. aquifolium</td>
<td>Aragan*</td>
<td>Indigestion&lt;sup&gt;d,i,s&lt;/sup&gt;</td>
<td>0.23</td>
<td>20.54</td>
<td>Folk remedy for fever, goiter, scrofula, and urinary problems (Anggadiredja 2009); fucoidan extracts stimulate intestinal immunological activities (Yuguchi et al. 2016)</td>
</tr>
<tr>
<td>17</td>
<td>Sargassum cf. ilicifolium</td>
<td>Aragan*</td>
<td>Indigestion&lt;sup&gt;d,i,s&lt;/sup&gt;</td>
<td>0.23</td>
<td>39.67</td>
<td>Folk remedy for goiter and scrofula (Anggadiredja 2009); inhibits collagen degradation (Prasedya et al. 2021); shows anti-microbial (Violando and Safitri 2020), anti-oxidant (Prasedya et al. 2021), anti-inflammatory (Yu et al. 2016, Saraswati et al. 2020, 2021), and anti-coagulant activities (Manggaat et al. 2019); exhibits anti-proliferative against cancer cells (Namvar et al. 2014, Wang et al. 2015)</td>
</tr>
<tr>
<td>18</td>
<td>Turbinaria ornata</td>
<td>Aragan*</td>
<td>Indigestion&lt;sup&gt;d,i,s&lt;/sup&gt;</td>
<td>0.04</td>
<td>14.62</td>
<td>Folk remedy for fever, goiter, scrofula, and stomach problems (Anggadiredja 2009); potential treatment for inflammatory bowel diseases (Lee et al. 2020) and anti-arthritis (Ananthi et al. 2017); inhibits cell proliferation, vascular formation (Canoy and Bitacura 2018), and enzymes related to diabetes (Unnikrishnan et al. 2014) shows anti-bacterial (Ward and Deyab 2016), anti-fungal (Zubair et al. 2019), anti-oxidant, and anti-proliferative effects (Chakraborthy et al. 2013; Chakraborthy and Joseph 2016; Ananthi et al. 2017; Deepak et al. 2017; Bhardwaj et al. 2020a, b); hexadecenoic acid extracts (Bharath et al. 2021) and synthesized metal nanoparticles can be employed for cancer therapy (Remya et al. 2018), the latter can be used as mosquitocidal agent (Deepak et al. 2018)</td>
</tr>
<tr>
<td>19</td>
<td>Phycocalidula acanthophora</td>
<td>Gamet*</td>
<td>Dampered sexual desire&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.09</td>
<td>15.49</td>
<td>Constitutes potential anti-oxidant compounds [as Porphyra suborbiculata in Ramil (2014)]</td>
</tr>
<tr>
<td>20</td>
<td>Chondrophycus undulatus</td>
<td>Itip-itip*</td>
<td>Diarrhea&lt;sup&gt;a,i,s&lt;/sup&gt;</td>
<td>0.02</td>
<td>8.33</td>
<td>Shows anti-oxidant (Li et al. 2009) and anti-asthma properties (Jung et al. 2009)</td>
</tr>
<tr>
<td>21</td>
<td>Digineoa simplex</td>
<td>Bodo-bodo</td>
<td>Parasitic infection&lt;sup&gt;d,i,s&lt;/sup&gt;</td>
<td>0.28</td>
<td>16.67</td>
<td>Folk remedy as vermifuge (Tseng 1935; Tungpalan 1983; Anggadiredja 2009); shows anti-helminthic (Kreitmair 1925) and anti-inflammatory activity (Pereira et al. 2009); shows anti-helminthic (Ramal 2014); the latter can be used as mosquitocidal agent (Deepak et al. 2018)</td>
</tr>
<tr>
<td>22</td>
<td>Laurencia okamurae</td>
<td>Culot*</td>
<td>Diarrhea&lt;sup&gt;a,i,s&lt;/sup&gt;</td>
<td>0.02</td>
<td>13.06</td>
<td>Shows inhibitory effects against prolyl endopeptidase, tyrosinase, and thrombus coagulation (Lee et al. 1999); cytotoxic activity against cancer cells (Ryu et al. 2002)</td>
</tr>
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<tr>
<td>23</td>
<td>Palisada perforata</td>
<td>Tar-taripta*</td>
<td>Diarrhea</td>
<td>0.02</td>
<td>16.67</td>
<td>Folk remedy as vermifuge (Titlyanov et al. 2012); potential for anti-diabetic and antioxidant use (Pirian et al. 2017); shows anti-microbial (Kavita et al. 2014; Shaaban et al. 2021), anti-malarial (Wright et al. 1996) and insecticidal activities (Abou-Elnaga et al. 2011); inhibits tyrosinase production (Namjooyan et al. 2019); contains compounds potential for cancer treatment (Murad et al. 2016; Ragasa et al. 2016; Tannoury et al. 2017; Ghanam et al. 2018; Elia et al. 2020); synthesized metal nanoparticles can be employed for drug development for cancer therapy (Montasser et al. 2017)</td>
</tr>
<tr>
<td>24</td>
<td>Gelidiella acerosa</td>
<td>Cul-culbet, culot*</td>
<td>Rheumatism</td>
<td>0.28</td>
<td>66.98</td>
<td>Shows anti-oxidant, anti-cholinesterase, and neuroprotective activities (Syad et al. 2012; Suganthy et al. 2013; Syad and Kasi 2014; Ilavarasi et al. 2015); extracts indicate neuroprotective potential against peptide mediated toxicity (Nisha and Devi 2017) and may alter pathophysiology of Alzheimer’s disease (Syad and Devi 2015); potential to reduce viability of cancer cells (Begum and Hemalatha 2020)</td>
</tr>
<tr>
<td>25</td>
<td>Gloiopeltis com-planata</td>
<td>Pan-panao</td>
<td>Headache</td>
<td>0.21</td>
<td>28.46</td>
<td>Funoran extracts are potential as anti-viral agents (Takano et al. 1995)</td>
</tr>
<tr>
<td>26</td>
<td>Hypnea charoides</td>
<td>Culot ti pusa*</td>
<td>Goiter</td>
<td>0.07</td>
<td>14.48</td>
<td>Claimed remedies for anti-helminthic, antibiotic and anti-tumor; treatment for goiter (Trono 1997)</td>
</tr>
<tr>
<td>27</td>
<td>Gracilaria cf. arcuata</td>
<td>Cao-caoy-an*</td>
<td>Abdominal ache, asthma, cough, diarrea</td>
<td>0.16</td>
<td>25.11</td>
<td>Folk remedy for cough, goiter, scrofula and stomach and urinary problems, diarrhea, pulmonary, intestinal, and urinary disorders (Tungpalan 1983; Anggadiredja 2009); claimed remedies for anti-microbial, joint and stomach pains, pulmonary, and intestinal disorders (Trono 1997); shows anti-microbial activity (Agra Wijjana et al. 2018); stimulates in colorectal cancer cell lines (Taheri et al. 2018)</td>
</tr>
<tr>
<td>28</td>
<td>Gracilaria edulis</td>
<td>Cao-caoy-an*</td>
<td>Abdominal ache, asthma, cough, diarrea</td>
<td>0.29</td>
<td>52.58</td>
<td>Claimed remedies for anti-microbial, joint and stomach pains, pulmonary and intestinal disorders (Trono 1997); potential for anti-microbial (Kolanjnathan et al. 2014; Abhishek Biswal and Vivek 2019), anti-cancer agents (Sundaram et al. 2012; Patra and Muthuraman 2013); synthesized metal nanoparticles can be employed for drug development for mosquitocidal agents (Madhiyazhagan et al. 2017) and cancer therapy (Priyadharsihini et al. 2014; Mohamed Asik et al. 2019)</td>
</tr>
<tr>
<td>29</td>
<td>Gracilaria euchematomoides</td>
<td>Ang-ga-pang*</td>
<td>Abdominal ache, asthma, cough, diarrea</td>
<td>0.14</td>
<td>10.25</td>
<td>Claimed remedies for emollient, cough, anti-microbial, joint and stomach pains, diarrhea, pulmonary, intestinal, and urinary disorders (Tungpalan 1983; Nadkarni 1992; Trono 1997); exhibits hemagglutinins activities (Din et al. 2008)</td>
</tr>
<tr>
<td>30</td>
<td>Gracilaria salicornia</td>
<td>Lung-lun-gaan*</td>
<td>Abdominal ache, asthma, cough, diarrea</td>
<td>0.02</td>
<td>42.28</td>
<td>Claimed remedies for anti-microbial, joint and stomach pains, and pulmonary and intestinal disorders (Trono 1997); contains lipoxygenase inhibitor potential against asthma (Antony and Chakraborty 2020a, b); shows anti-microbial (Sacindia et al. 2009; Vijayavel and Martinez 2010; Bahrun et al. 2021; Ramezanpour et al. 2021), anti-oxidant (Widowati et al. 2021) and anti-leishmanial activities (Fouladvand et al. 2011); exhibits hemagglutinins activities (Din et al. 2008)</td>
</tr>
<tr>
<td>31</td>
<td>Gracilaria textorii</td>
<td>Lab-labig*</td>
<td>Abdominal ache, asthma, cough, diarrea</td>
<td>0.07</td>
<td>23.42</td>
<td>Claimed remedies for cough, anti-microbial, joint and stomach pains, diarrhea, and pulmonary and intestinal disorders (Tungpalan 1983; Trono 1997); shows anti-inflammatory (Park and Yoon 2019) and anti-diabetic activities (Li et al. 2005)</td>
</tr>
<tr>
<td>32</td>
<td>Halymenia durvillei</td>
<td>Gayong-gayong*</td>
<td>Indigestion</td>
<td>0.08</td>
<td>12.97</td>
<td>Extracts are potential dermatological use (Filaire 2011) and as SARS-CoV-2 inhibitor (Tassalaka et al. 2021)</td>
</tr>
<tr>
<td>33</td>
<td>Sciniaia hormoides</td>
<td>Garginatis*</td>
<td>Dampened sexual desire</td>
<td>0.01</td>
<td>13.89</td>
<td>No reported medicinal use</td>
</tr>
<tr>
<td>34</td>
<td>Sciniaia moniliformis</td>
<td>Garginatis*</td>
<td>Dampened sexual desire</td>
<td>0.04</td>
<td>20.31</td>
<td>Potential for anti-tumor drug agent (Tokimura et al. 2012)</td>
</tr>
</tbody>
</table>

*Edible species validated during the actual survey and previously listed in Dumilag (2018) a: alcohol extract; d: decoction (including decoction bath); i: infusion; o: ointment (cream); p: poultice (cataplasm); s: syrup. Refer to Table 3 for the mode of preparation and administration.
Less common uses included treatment for musculoskeletal pain (headache or rheumatism) and as an antidote for insect bites (each use category had 2 spp. representing 5.88%). *Diginea simplex* was the only recorded species with an anti-helminthic value (referring to the ICF value of 1.00 under parasitic infection).

The mode of use of medicinal seaweeds identified in this study is presented in Table 3. Applied for 32 species (or 94.12%), the most frequently utilized mode of treatment was decoction (see Table 1). Seaweed medicine was mostly prepared using water as the excipient. The *Hy. clathratus* was the only recorded species that can be added to alcohol to treat skin allergy. Ilocano herbalists exercised some healing rituals (prayers in Latin or Ilocano) during the administration of seaweed-based medicine (also including all other healing resources available to them). All recorded medicinal seaweeds were taken orally (including inhalation), whereas 35.29% (12 spp.) can be administered topically.

The comparison of the present list with those previous ethnobotanical records and published pharmacological and phytochemical studies is shown in Figure 3. All but *Scinaia hormoides* (Figure 2f) were identified to have other known folk and scientifically-based medicinal value (Table 1). Eleven (11) species (32.35%) were known to have similar traditional use as compared to other Asian folk practices, whereas 19 species (55.88%) were used to treat other illnesses. Although most records of Ilocano folk seaweed medicine matched with other medical values (*i.e.* unknown to the locals) appraised in the scientific literature (82.35% or 28 spp.), 23.53% (or 8 spp.) indicated similar use known to the locals supported by scientific evidence.

### Seasonality and Distribution

The distribution of folk seaweed species collected in this study is presented in Figure 4. The highest number of collected species was found in Pagudpud (n = 26),

<table>
<thead>
<tr>
<th>No.</th>
<th>Disease category</th>
<th>No. of species</th>
<th>ICF value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antidote (insect bite)</td>
<td>2</td>
<td>0.99</td>
</tr>
<tr>
<td>2</td>
<td>Respiratory disorders (cough, asthma)</td>
<td>9</td>
<td>0.98</td>
</tr>
<tr>
<td>3</td>
<td>Gastrointestinal disease (diarrhea, indigestion, stomach aches)</td>
<td>14</td>
<td>0.97</td>
</tr>
<tr>
<td>4</td>
<td>Glandular disorder (goiter)</td>
<td>7</td>
<td>0.97</td>
</tr>
<tr>
<td>5</td>
<td>Dermatological problems (pruritis, skin allergy, skin infection)</td>
<td>3</td>
<td>0.99</td>
</tr>
<tr>
<td>6</td>
<td>Sexual related problem (dampened sexual desire)</td>
<td>3</td>
<td>0.95</td>
</tr>
<tr>
<td>7</td>
<td>Musculoskeletal pain (headache, rheumatism)</td>
<td>2</td>
<td>0.99</td>
</tr>
<tr>
<td>8</td>
<td>Parasitic infection</td>
<td>1</td>
<td>1.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Mode</th>
<th>Preparation and administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alcohol extract</td>
<td>Thalli are immersed in alcohol; vinegar can be substituted. Apply directly over affected areas twice daily. The solution can be placed in an amber bottle and can be stored in a cool dry place.</td>
</tr>
<tr>
<td>2</td>
<td>Decoction (including decoction bath)</td>
<td>Thalli are chopped into small pieces and are boiled with water. Allowed to cool for 15–30 min before drinking. For skin allergies, the decoction is added to water as a herbal bath and is taken in less than 15 min. As aphrodisiacs, dried thalli are crushed, mixed, and decocted with a small amount of oil. Take 2–3 tablespoons daily.</td>
</tr>
<tr>
<td>3</td>
<td>Infusion</td>
<td>Thalli are chopped into small pieces. Boiled water slowly poured. Allowed to cool for 15–20 min before drinking. Pure honey or sugar may be added. For respiratory disorders, inhaling the vapor can soothe bronchial passages. To get the full benefit of the vapor, the patient should cover oneself with a blanket up to the head so that no vapor will escape. The treatment should not last longer than 15 min.</td>
</tr>
<tr>
<td>4</td>
<td>Ointment (cream)</td>
<td>Thalli are crushed until they become mushy. A little amount of coconut oil or lard added and then stirred. Apply directly over affected areas twice daily. The solution can be placed in an amber bottle and can be stored in a cool dry place.</td>
</tr>
<tr>
<td>5</td>
<td>Poultice (cataplasm)</td>
<td>Thalli are crushed and mixed with a little hot or cold water. Applied directly over affected area. Applied area covered with a clean cloth.</td>
</tr>
<tr>
<td>6</td>
<td>Syrup</td>
<td>Thalli are boiled in hot water with sugar until the desired consistency is obtained. As a laxative, take 1–2 tablespoons every 3 h before retiring to bed.</td>
</tr>
</tbody>
</table>
Burgos (n = 24), and Currimao (n = 22), followed by Pasuquin (n = 17) and Badoc (n = 14). Only 11 species were collected from Paoay. There was a marked variation between the distribution of medicinal seaweeds per site in dry and wet seasons. Only *Gelidiella acerosa* (Figure 2d) was found to be growing in all sites year-round. Five other species – *C. racemosa*, *Hy. clathratus*, *Padina australis*, *Sargassum cf. ilicifolium*, and *Gracilaria edulis* (Figure 2e) – were encountered in all sites but with a varying range of seasonal abundance (7–12 mon). *Caulerpa serrulata* was only encountered in Paoay during both seasons. The *H. charoides* and *S. hormoides* were only found in Pagudpud and were merely abundant during the wet season. The *D. simplex* was also only encountered in Pagudpud but thrived only during the dry season. The *P. acanthophora* grew only during the wet season in Pagudpud and Burgos.

**Ethnobotanical Indices**

The UV values ranged from 0.01–0.59 (Table 1). The highest value of UV ranked *C. racemosa* (0.59) first, followed by *Hy. clathratus* (0.30) and *G. edulis* (0.29). The *Co. intricatum* (84.56%), *G. acerosa* (66.98%), and *C. racemosa* (65.37%) were the top three species with the highest FL scores (Table 1). These were used for treating goiter, rheumatism, and respiratory disorders, respectively. The most frequently used species in each category were generally those taxa with either high UV or high FL. A positive significant correlation was found between UV and FL values (Spearman $r = 0.69$; $p <$
ICFs were calculated using reports in each of the eight categories (Table 2). The scores for ICF values were highly homogenous in all reported disease categories, ranging between 0.95–1.00 (Table 2).

The locals from Burgos and Pagudpud were the most familiar with seaweeds with medicinal value (Figure 5). The compiled list from Burgos was most similar to that of Currimao and Pagudpud (JCS = 0.37% and 0.36% or 15 and 14 common species, respectively). Three species were common to all sites – namely, C. racemosa, Co. intricatum, and Sargassum cf. aquilfolium (see Figure 2). Medicinal seaweeds exclusively used by the locals were identified in Pasuquin (Chondrophycus undulatus, Laurencia okamurae, and Palisada perforata), Burgos (Halymena durvillei), Paoay (C. serrulata), and Pagudpud (D. simplex).

**DISCUSSION**

The present study showed that a total of 34 seaweed species in Ilocos Norte have perceived local medicinal values. Tungpalan (1983) previously reported 13 medicinal seaweeds locally use in the province, of which only five species were verified with the current data (Halimeda macroloba, Gracilaria eucheumatoides, Gracilaria arcuata, Gracilaria textori, and D. simplex). The unidentified Sargassum species in Tungpalan’s (1983) list may match possible species recognized in this study. Validation of the identity of Halimeda species is also desired. When various Philippine materials were sequenced, the morphologically identified Halimeda cuneata and Halimeda tuna turned out to be Halimeda discoidea and Halimeda gigas, respectively (Verbruggen et al. 2005). The presence of H. tuna in the entire Indo-Pacific region was doubtful as this species occurs only in the Mediterranean.

**Table 2.** Seaweed species with medicinal value in Ilocos Norte.

<table>
<thead>
<tr>
<th>No.</th>
<th>Species</th>
<th>Pg</th>
<th>Bu</th>
<th>Ps</th>
<th>Py</th>
<th>Cu</th>
<th>Bd</th>
<th>Total months observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Caulerpa racemosa</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Caulerpa serrulata</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Caulerpa sertulioidea</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Codium arabicum</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Codium intricatum</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Codium cf. tenue</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Halimeda incrassata</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Halimeda macroloba</td>
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<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Halimeda opuntia</td>
<td>D</td>
<td>W</td>
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<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Ulva australis</td>
<td>D</td>
<td>W</td>
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<td>W</td>
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<td></td>
</tr>
<tr>
<td>11</td>
<td>Ulva lactuca</td>
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<td></td>
</tr>
<tr>
<td>12</td>
<td>Hydroclathrus clathralus</td>
<td>D</td>
<td>W</td>
<td>D</td>
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<td>D</td>
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<td></td>
</tr>
<tr>
<td>13</td>
<td>Padina australis</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Padina minor</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Pseudochaetospora impexa</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Sargassum cf. aquilfolium</td>
<td>D</td>
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</tr>
<tr>
<td>17</td>
<td>Sargassum cf. illicolum</td>
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<td>W</td>
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<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Turbinaria ornata</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Chondrophycus undulatus</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Diginea simplex</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Halymena durvillei</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Gelidium acerosum</td>
<td>D</td>
<td>W</td>
<td>D</td>
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<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Glosopeltis complanata</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
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<td></td>
</tr>
<tr>
<td>24</td>
<td>Gracilaria cf. arcuata</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Gracilaria edulis</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
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<td></td>
</tr>
<tr>
<td>26</td>
<td>Gracilaria eucheumatoides</td>
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<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Gracilaria salicornia</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Gracilaria textori</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Hypnea charoides</td>
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<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Laurencia okamurae</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Palisada perforata</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Phycodictidion acanthophora</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Scinaia hormoides</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Scinaia moniliformis</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td>D</td>
<td>W</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4. Seasonal distribution chart of folk medicinal seaweeds in Ilocos Norte.
and Atlantic seas (Kooistra et al. 2002; Dijoux et al. 2012). Considering the possible reduction in the former list based on the current taxonomic developments and possible matches of unidentified species with those species reported here, four species can be added to the current list – namely, *H. discoidea*, *H. gigas*, *Gracilaria coronopifolia*, and *Gracilaria longissima* (as *Gracilaria verrucosa*). The number of identified folk medicinal seaweed species in Ilocos Norte is, therefore, increased to 38.

The highest number of ethnobotanically used medicinal seaweeds in this study belonged to Division Rhodophyta. This might be due to the relatively high number of rhodophytes in Ilocos Norte as compared with other taxa (Cordero 1977; Silva et al. 1987). Rhodophytes were also known to constitute a diverse set of bioactive compounds (Cotas et al. 2020). With five species, the highest number of rhodophytes belonged to the Order Gracilariales, which consistently had folk claims against respiratory and gastrointestinal related illnesses. Chiefly related to sulfated agarans, gracilarioids were clinically indicated to be potential sources against various illnesses, including those against respiratory and gastrointestinal problems (Torres et al. 2019). Digestive and respiratory problems appeared to have been more common indications to which seaweeds are medicinally applied by the Ilocano. Both disease categories were reflected as two of the highest cause of death incidence in the area (DOH 2016).

Although the present study had the main goal of documenting medicinal seaweeds, over two-thirds of the entire list of species were edible. As referenced in Dumilag (2018), three of which were newly reported as edible seaweed for Ilocos Norte – namely, *Codium arabicum*, *S. cf. aquifolium*, and *Turbinaria ornata*. These species were, however, historically known as traditional food sources elsewhere (Pereira et al. 2014). Following the high number of seaweed edibles, oral administration was the most frequently used, simplest, and fastest mode of drug management. Edibility appeared to be a crucial factor in choosing seaweed species bearing medicinal value as reflected for other folk biological resources (Pieroni and Price 2006).
Caulerpa racemosa was the most cited medicinal seaweed. This species may be used most frequently because of its common occurrence in the area, as well as its availability as a seaweed typically sold in local markets. Other reasons might be the high trust of the Ilocano to this species as a cure for pulmonary illnesses (high FL score) and as an alternative medicine to the relatively meager medication system within the area or the higher cost of commercial drugs. Caulerpa racemosa was clinically tested to contain lipoxygenase inhibitor that has potential against asthma (Cengiz et al. 2011), as well other contra-indications (see Table 1).

Significantly higher medicinal UVs were obtained for species that were regarded by the Ilocano as more easily accessible or as more abundant. These include at least three species – namely, C. racemosa, Co. intricatum, and Sargassum cf. aquifolium. Pagudpud, Burgos, and Currimao had the highest number of species, as well as among the sites with the highest shared medicinal seaweeds known to their local residents. The greater homogeneity of data may have been attributed to the high physiographic similarity of these sites (rocky sandy and coralline type of substrate), which supports diverse seaweed vegetation relative to other sites dominated by muddy-sandy to pebble-rich substrates.

A positive significant correlation was found between scores obtained for UV and FL indices – indicating that the greater the UV of a particular species, the more locals prefer to use it. Seaweed species with higher UVs/FLs have also shown to have wider medicinal use in the modern time (see Table 1) – in part, validating claims of their proven healing potential. The high ICF value consistently computed for every category identified in this study indicated that Ilocano generally agree on which seaweed to use. Similar patterns have also been observed in other previous ethnobotanical studies done in the Philippines with a focus on terrestrial plants (Abe and Ohtani 2013; Waay-Juico et al. 2017; Dapar et al. 2020).

High UV, FL, and ICF values are key indicators of species selection of interest for the search for bioactive compounds (Andrade-Cetto and Heinrich 2011). Caulerpa racemosa, Co. intricatum, Hy. clathratus, G. edulis, and G. acerosa may be considered a high priority for further phytochemical tests. Indeed, in 2019, the Philippine media has spurred attention to local news on the property of Codium spp. (popoklo) as potential sources against cancer (The Manila Times 2019). The claims were later validated using Ilocano materials of Co. edule and Co. intricatum (Bayro et al. 2019; Vasquez et al. 2019; Vasquez and Lirio 2020).

The use of seaweeds is well-distinguished among Asian cultures, which could most likely have descended from common cultural descendants. This is reflected, in part, of the observed similar benefits of the common species used by other Asian cultures (Tseng 1935; Waaland 1981; Chengkui and Junfu 1984; Ismail 1995; Anggadirejda 2009; Titlyanov et al. 2012). Pharmacological and phytochemical studies evidence a remarkable similarity between therapeutic uses of folk medicinal seaweeds and reports from scientific literature (Liu et al. 2012; Shannon and Abu-Ghannam 2019). In this study, the highest number of species overlap was between the present list and the list of similar species that have been scientifically tested but for other disease treatments unknown to Ilocano practices. It can be deduced that additional health benefits may possibly be gained in addition to the perceived medicinal value of these seaweeds.

Folk medicine using seaweed resources was practiced mainly by older populations. The younger generation may link the use of folk biological resources more with superstitions or deem it generally ineffective (Benz et al. 2000; Odora Hoppers 2002; Srithi et al. 2009). Determination of knowledge loss about the use of folk medicinal seaweeds among young Ilocano populations can unravel the complexity of changes in traditional knowledge systems. This effort allows the identification of a more meaningful insight into resource and cultural conservation, which are likely threatened by urbanization, loss of traditional lifestyle, and rural marginalization.

This report can be regarded as a snapshot in time of ethnobotanical knowledge in Ilocos Norte, particularly on how seaweeds were used as a medicinal source over the past two decades. Seaweed ethnobotanical work in the Philippines is not adequately funded and is barely countenanced by research funding, especially for drug discovery and other aspects bioprospecting. We were frozen out of funding opportunities when this work attempted to understand the changing landscape of seaweed use knowledge in Ilocos Norte. This study, therefore, provided results “as-is” as a historical record with updates not to be expected at this time. It is recommended that a similar study at the present time be conducted to compare the practice of traditional seaweed-based medicine with the Ilocano, the perceptions of the younger generations, as well as their current economic condition and access to modern medicine. It will also be of interest to compare the species list and their distribution with the report presented here with studies aimed at understanding the current threats to the seaweed habitats (e.g. coastal development and population increase) and the impacts of ongoing and increasingly rapid climate change.
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